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**Department of Defense
Fiscal Year (FY) 2022 Budget Estimates**

May 2021



Air Force

Justification Book Volume 2 of 3

Research, Development, Test & Evaluation, Air Force

Vol-II

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Air Force • Budget Estimates FY 2022 • RDT&E Program

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Fiscal Year (FY) 2022 Budget Estimates RDT&E Descriptive Summaries Budget Activities May 2021

INTRODUCTION AND EXPLANATION OF CONTENTS

GENERAL

- This document has been prepared to provide information on the United States Air Force (USAF) Research, Development, Test and Evaluation (RDT&E) program elements and projects in the FY 2022 President's Budget (PB).
 - All exhibits in this document have been assembled in accordance with DoD 7000.14R, Financial Management Regulation, Volume 2B, Chapter 5.
 - Other comments on exhibit contents in this document:
 - Exhibits R-2/2a and R-3 provide narrative information for all RDT&E program elements and projects within the USAF FY 2022 RDT&E program with the exception of classified program elements. The format and contents of this document are in accordance to the guidelines and requirements of the Congressional committees in so far as possible.
 - The "Other Program Funding Summary portion of the R-2 includes, in addition to RDTE& funds, Procurement funds and quantities, Military Construction appropriation funds on specific development programs, Operations and Maintenance appropriation funds where they are essential to the development effort described, and where appropriate, Department of Energy (DOE) costs.

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- All exhibits contained in Volumes I, II, and III are unclassified. Classified exhibits are not included in the submission due to the level of security classification and necessity of special security clearances.

Exhibit footnotes for FY 2020 actuals and FY 2021 Enacted:

- a. FY 2020 Actuals: **“Includes Division A, Title IX and X of the Consolidated Appropriations Act, 2020 (P.L. 116-93), Division F, Title IV and V from the Further Consolidated Appropriations Act, 2020 (P.L. 116-94) and the Coronavirus Aid, Relief, and Economic Security Act (P.L. 116-136).”**
- b. FY 2021 Enacted (for every appropriation except O&M, Army, O&M, Navy, and O&M, AF): **“Includes Division C, Title IX and Division J, Title IV of the Consolidated Appropriations Act, 2021 (P.L. 116-260).”**
- c. FY 2021 Enacted (for O&M, Army, O&M, Navy, and O&M, AF): “Includes Division C, Title IX and Division J, Title IV of the Consolidated Appropriations Act, 2021 (P.L. 116-260) and funds provided by the Congress as OCO to Base Requirements in O&M Army, O&M Navy, and O&M AF.”

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Summary Recap of Budget Activities -----	FY 2020 Actual*	FY 2021 Enacted**	FY 2022 Request
Basic Research	517,217	536,314	490,706
Applied Research	1,687,989	1,777,710	1,488,286
Advanced Technology Development	956,409	1,000,257	810,639
Advanced Component Development & Prototypes	8,137,663	8,794,661	10,516,657
System Development & Demonstration	6,521,351	6,197,754	5,909,640
Management Support	3,911,806	3,153,492	3,371,430
Operational Systems Development	24,069,528	25,290,981	27,290,550
Software and Digital Technology Pilot Programs		149,742	572,807
Total Research, Development, Test & Evaluation	45,801,963	46,900,911	50,450,715
 Summary Recap of FYDP Programs -----			
Strategic Forces	783,840	1,000,079	1,173,877
General Purpose Forces	3,638,050	3,811,478	4,488,007
Intelligence and Communications	1,187,219	1,127,255	1,013,665
Mobility Forces	883,396	1,010,820	844,787
Research and Development	15,377,077	14,184,508	15,653,055
Central Supply and Maintenance	35,898	113,472	86,648
Training Medical and Other	8,302	7,061	10,944
Administration and Associated Activities	87,640	69,398	35,212
Support of Other Nations	3,922	3,592	2,420

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	FY 2020 Actual*	FY 2021 Enacted**	FY 2022 Request
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Space	6,114,555	6,892,677	6,798,318
Classified Programs	17,682,064	18,680,571	20,343,782
Total Research, Development, Test & Evaluation	45,801,963	46,900,911	50,450,715

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Appropriation: 3600F Research, Development, Test & Eval, AF

Line No	Program Element Number	Item	Act	FY 2020 Actual*	FY 2021 Enacted**	FY 2022 Request	Se
1	0601102F	Defense Research Sciences	01	331,102	324,755	328,303	U
2	0601103F	University Research Initiatives	01	172,379	196,502	162,403	U
3	0601108F	High Energy Laser Research Initiatives	01	13,736	15,057		U
		Basic Research		517,217	536,314	490,706	
4	0602020F	Future AF Capabilities Applied Research	02		79,854	79,901	U
5	0602102F	Materials	02	212,551	237,847	113,460	U
6	0602201F	Aerospace Vehicle Technologies	02	148,176	164,426	163,032	U
7	0602202F	Human Effectiveness Applied Research	02	128,434	133,877	136,273	U
8	0602203F	Aerospace Propulsion	02	214,814	201,048	174,683	U
9	0602204F	Aerospace Sensors	02	210,940	232,876	193,514	U
10	0602212F	Defense Laboratories R&D Projects (10 U.S.C, Sec 2358)	02	100,519			U
11	0602298F	Science and Technology Management - Major Headquarters Activities	02	8,346	8,910	8,891	U
12	0602602F	Conventional Munitions	02	132,090	127,193	151,757	U
13	0602605F	Directed Energy Technology	02	114,297	130,375	121,869	U
14	0602788F	Dominant Information Sciences and Methods	02	214,376	215,275	169,110	U
15	0602890F	High Energy Laser Research	02	47,462	29,155		U
16	1206601F	Space Technology	02	155,984			U
		Applied Research		1,687,989	1,560,836	1,312,490	
17	0603032F	Future AF Integrated Technology Demos	03		147,350	131,643	U
18	0603112F	Advanced Materials for Weapon Systems	03	58,657	60,059	31,905	U
19	0603199F	Sustainment Science and Technology (S&T)	03	14,376	16,902	21,057	U

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20	0603203F	Advanced Aerospace Sensors	03	40,116	35,274	44,730	U
21	0603211F	Aerospace Technology Dev/Demo	03	95,730	62,117	70,486	U
22	0603216F	Aerospace Propulsion and Power Technology	03	161,352	144,229	75,273	U
23	0603270F	Electronic Combat Technology	03	45,882	35,841	46,591	U
24	0603401F	Advanced Spacecraft Technology	03	75,405	87,608		U
25	0603444F	Maui Space Surveillance System (MSSS)	03	11,343	12,068		U
26	0603456F	Human Effectiveness Advanced Technology Development	03	32,827	31,667	24,589	U
27	0603601F	Conventional Weapons Technology	03	202,048	133,900	157,423	U
28	0603605F	Advanced Weapons Technology	03	32,578	31,388	28,258	U
29	0603680F	Manufacturing Technology Program	03	133,059	138,748	45,259	U
30	0603788F	Battlespace Knowledge Development and Demonstration	03	53,036	63,106	56,772	U
		Advanced Technology Development		956,409	1,000,257	733,986	
31	0603260F	Intelligence Advanced Development	04	5,672	4,312	5,795	U
32	0603742F	Combat Identification Technology	04	31,367	26,348	21,939	U
33	0603790F	NATO Research and Development	04	4,774	3,640	4,114	U
34	0603851F	Intercontinental Ballistic Missile - Dem/Val	04	29,881	32,899	49,621	U
35	0603859F	Pollution Prevention - Dem/Val	04	2,890			U
36	0604001F	NC3 Advanced Concepts	04			6,900	U
37	0604002F	Air Force Weather Services Research	04	747	2,234	986	U
38	0604003F	Advanced Battle Management System (ABMS)	04	139,203	158,492	203,849	U
39	0604004F	Advanced Engine Development	04	647,850	665,280	123,712	U

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40	0604006F	Architecture Initiatives	04			82,438	U
41	0604015F	Long Range Strike - Bomber	04	2,878,798	2,843,214	2,872,624	U
42	0604032F	Directed Energy Prototyping	04	42,390	19,429	10,820	U
43	0604033F	Hypersonics Prototyping	04	566,935	386,157	438,378	U
44	0604201F	PNT Resiliency, Mods, and Improvements	04	120,267		39,742	U
45	0604257F	Advanced Technology and Sensors	04	23,145	24,702	23,745	U
46	0604288F	Survivable Airborne Operations Center	04	12,205	59,390	133,253	U
47	0604317F	Technology Transfer	04	37,269	16,980	15,768	U
48	0604327F	Hard and Deeply Buried Target Defeat System (HDBTDS) Program	04	111,506	52,825	15,886	U
49	0604414F	Cyber Resiliency of Weapon Systems-ACS	04	54,676	69,656	71,229	U
50	0604776F	Deployment & Distribution Enterprise R&D	04	27,618	25,788	40,103	U
51	0604858F	Tech Transition Program	04	322,793	305,943	343,545	U
52	0605230F	Ground Based Strategic Deterrent	04	538,643	1,447,113	2,553,541	U
53	0207100F	Light Attack Armed Reconnaissance (LAAR) Squadrons	04	1,982			U
54	0207110F	Next Generation Air Dominance	04	872,539	902,440	1,524,667	U
55	0207455F	Three Dimensional Long-Range Radar (3DELRR)	04	22,469	19,321		U
56	0207522F	Airbase Air Defense Systems (ABADS)	04		8,721	10,905	U
57	0208030F	War Reserve Materiel - Ammunition	04			3,943	U
58	0208099F	Unified Platform (UP)	04	9,634	5,979		U
59	0305236F	Common Data Link Executive Agent (CDL EA)	04	36,893	39,221	43,881	U
60	0305251F	Cyberspace Operations Forces and Force Support	04		20,000		U

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61	0305601F	Mission Partner Environments	04	8,237	11,409	16,420	U
62	0306250F	Cyber Operations Technology Support	04	194,958	234,395	242,499	U
63	0306415F	Enabled Cyber Activities	04	16,024	10,541	16,578	U
64	0401310F	C-32 Executive Transport Recapitalization	04		6,197		U
65	0708051F	Rapid Sustainment Modernization (RSM)	04	5,802	19,964		U
66	0901410F	Contracting Information Technology System	04	22,266	5,662	20,343	U
67	1203164F	NAVSTAR Global Positioning System (User Equipment) (SPACE)	04	308,215			U
68	1203710F	EO/IR Weather Systems	04	121,723			U
69	1206422F	Weather System Follow-on	04	195,495			U
70	1206425F	Space Situation Awareness Systems	04	29,013			U
71	1206427F	Space Systems Prototype Transitions (SSPT)	04	137,470			U
72	1206438F	Space Control Technology	04	56,270			U
73	1206730F	Space Security and Defense Program	04	56,385			U
74	1206760F	Protected Tactical Enterprise Service (PTES)	04	101,583			U
75	1206761F	Protected Tactical Service (PTS)	04	154,237			U
76	1206855F	Evolved Strategic SATCOM (ESS)	04	161,882			U
77	1206857F	Space Rapid Capabilities Office	04	25,957			U
		Advanced Component Development & Prototypes		8,137,663	7,428,252	8,937,224	
78	0604200F	Future Advanced Weapon Analysis & Programs	05	4,993	22,894	23,499	U
79	0604201F	PNT Resiliency, Mods, and Improvements	05	202,354	38,494	167,520	U
80	0604222F	Nuclear Weapons Support	05	4,249	26,057	30,050	U

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81	0604270F	Electronic Warfare Development	05	1,994	2,094	2,110	U
82	0604281F	Tactical Data Networks Enterprise	05	182,691	121,188	169,836	U
83	0604287F	Physical Security Equipment	05	11,122	6,740	8,469	U
84	0604329F	Small Diameter Bomb (SDB) - EMD	05	44,530			U
85	0604602F	Armament/Ordnance Development	05	29,505	23,034	9,047	U
86	0604604F	Submunitions	05	3,043	3,085	2,954	U
87	0604617F	Agile Combat Support	05	31,133	18,980	16,603	U
88	0604618F	Joint Direct Attack Munition	05		6,806		U
89	0604706F	Life Support Systems	05	14,137	28,608	25,437	U
90	0604735F	Combat Training Ranges	05	52,678	23,854	23,980	U
91	0604800F	F-35 - EMD	05	7,420	5,413		U
92	0604932F	Long Range Standoff Weapon	05	701,866	384,727	609,042	U
93	0604933F	ICBM Fuze Modernization	05	155,476	156,693	129,709	U
94	0605030F	Joint Tactical Network Center (JTNC)	05	2,326			U
95	0605056F	Open Architecture Management	05	28,902	30,491	37,109	U
96	0605221F	KC-46	05	52,623		1	U
97	0605223F	Advanced Pilot Training	05	328,414	248,216	188,898	U
98	0605229F	HH-60W	05	238,457	63,054	66,355	U
99	0605931F	B-2 Defensive Management System	05	224,358			U
100	0101125F	Nuclear Weapons Modernization	05	10,157	9,665		U
101	0207171F	F-15 EPAWSS	05	46,040	170,368	112,012	U

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102	0207328F	Stand In Attack Weapon	05	151,534	150,371	166,570	U
103	0207701F	Full Combat Mission Training	05	11,238	9,405	7,064	U
104	0305176F	Combat Survivor Evader Locator	05		971		U
105	0401221F	KC-46A Tanker Squadrons	05		76,023	73,458	U
106	0401310F	C-32 Executive Transport Recapitalization	05	62			U
107	0401319F	VC-25B	05	730,183	799,429	680,665	U
108	0701212F	Automated Test Systems	05	2,685	10,654	15,445	U
109	0804772F	Training Developments	05		4,471	4,482	U
110	0901299F	AF A1 Systems	05		7,453		U
111	1203176F	Combat Survivor Evader Locator	05	1,949			U
112	1203269F	GPS III Follow-On (GPS IIIF)	05	427,210			U
113	1203940F	Space Situation Awareness Operations	05	51,749			U
114	1206421F	Counterspace Systems	05	26,246			U
115	1206422F	Weather System Follow-on	05	2,155			U
116	1206425F	Space Situation Awareness Systems	05	349,612			U
117	1206431F	Advanced EHF MILSATCOM (SPACE)	05	111,023			U
118	1206432F	Polar MILSATCOM (SPACE)	05	385,665			U
119	1206433F	Wideband Global SATCOM (SPACE)	05	1,855			U
120	1206441F	Space Based Infrared System (SBIRS) High EMD	05	1			U
121	1206442F	Next Generation OPIR	05	1,470,278			U
122	1206445F	Commercial SATCOM (COMSATCOM) Integration	05	4,817			U

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123	1206853F	National Security Space Launch Program (SPACE) - EMD	05	414,621			U
		System Development & Demonstration		6,521,351	2,449,238	2,570,315	
124	0604256F	Threat Simulator Development	06	58,906	57,620	41,909	U
125	0604759F	Major T&E Investment	06	106,014	208,299	130,766	U
126	0605101F	RAND Project Air Force	06	33,968	35,738	36,017	U
127	0605502F	Small Business Innovation Research	06	884,237			U
128	0605712F	Initial Operational Test & Evaluation	06	13,288	13,532	12,582	U
129	0605807F	Test and Evaluation Support	06	795,626	761,307	811,032	U
130	0605826F	Acq Workforce- Global Power	06	256,906	270,781		U
131	0605827F	Acq Workforce- Global Vig & Combat Sys	06	264,506	254,768	243,796	U
132	0605828F	Acq Workforce- Global Reach	06	159,011	157,964	435,930	U
133	0605829F	Acq Workforce- Cyber, Network, & Bus Sys	06	241,623	254,838	435,274	U
134	0605830F	Acq Workforce- Global Battle Mgmt	06	166,552	177,811		U
135	0605831F	Acq Workforce- Capability Integration	06	239,728	219,467	243,806	U
136	0605832F	Acq Workforce- Advanced Prgm Technology	06	38,517	58,477	103,041	U
137	0605833F	Acq Workforce- Nuclear Systems	06	135,770	179,318	226,055	U
138	0605898F	Management HQ - R&D	06	5,932	5,724	4,079	U
139	0605976F	Facilities Restoration and Modernization - Test and Evaluation Support	06	88,445	70,856	70,788	U
140	0605978F	Facilities Sustainment - Test and Evaluation Support	06	29,424	29,826	30,057	U
141	0606017F	Requirements Analysis and Maturation	06	81,734	68,256	85,799	U
142	0606398F	Management HQ - T&E	06	6,213	5,774	6,163	U

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143	0303166F	Support to Information Operations (IO) Capabilities	06			537	U
144	0303255F	Command, Control, Communication, and Computers (C4) - STRATCOM	06		21,525	25,340	U
145	0308602F	ENTEPRISE INFORMATION SERVICES (EIS)	06	10,239	9,865	28,720	U
146	0702806F	Acquisition and Management Support	06	5,696	13,384	37,211	U
147	0804731F	General Skill Training	06	6,238	1,260	1,506	U
148	0804772F	Training Developments	06			2,957	U
149	0909999F	Financing for Cancelled Account Adjustments	06	4,703			U
150	1001004F	International Activities	06	3,922	3,592	2,420	U
151	1206116F	Space Test and Training Range Development	06	14,515			U
152	1206392F	ACQ Workforce - Space & Missile Systems	06	187,110			U
153	1206398F	Space & Missile Systems Center - MHA	06	10,170			U
154	1206860F	Rocket Systems Launch Program (SPACE)	06	15,613			U
155	1206862F	Tactically Responsive Launch	06	21,965			U
156	1206864F	Space Test Program (STP)	06	25,235		3	U
		Management Support		3,911,806	2,879,982	3,015,788	
157	0604233F	Specialized Undergraduate Flight Training	07	2,492	11,556	5,509	U
158	0604445F	Wide Area Surveillance	07	19,268		2,760	U
159	0604776F	Deployment & Distribution Enterprise R&D	07	870	499		U
160	0604840F	F-35 C2D2	07	624,973	695,869	985,404	U
161	0605018F	AF Integrated Personnel and Pay System (AF-IPPS)	07	39,275	26,986	22,010	U
162	0605024F	Anti-Tamper Technology Executive Agency	07	46,934	47,107	51,492	U

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163	0605117F	Foreign Materiel Acquisition and Exploitation	07	68,397	71,099	71,391	U
164	0605278F	HC/MC-130 Recap RDT&E	07	16,523	19,491	46,796	U
165	0606018F	NC3 Integration	07	25,414	26,308	26,532	U
166	0606942F	Assessments and Evaluations Cyber Vulnerabilities	07		3,000		U
167	0101113F	B-52 Squadrons	07	308,048	482,741	715,811	U
168	0101122F	Air-Launched Cruise Missile (ALCM)	07	10,116	1,430	453	U
169	0101126F	B-1B Squadrons	07	1,000	15,737	29,127	U
170	0101127F	B-2 Squadrons	07	85,742	181,068	144,047	U
171	0101213F	Minuteman Squadrons	07	90,595	89,306	113,622	U
172	0101316F	Worldwide Joint Strategic Communications	07	25,312	31,166	15,202	U
173	0101324F	Integrated Strategic Planning & Analysis Network	07	23,542	24,227		U
174	0101328F	ICBM Reentry Vehicles	07	63,484	112,547	96,313	U
176	0102110F	UH-1N Replacement Program	07	165,844	41,388	16,132	U
177	0102326F	Region/Sector Operation Control Center Modernization Program	07		10,704	771	U
178	0102412F	North Warning System (NWS)	07		100	99	U
179	0102417F	Over-the-Horizon Backscatter Radar	07			42,300	U
180	0202834F	Vehicles and Support Equipment - General	07			5,889	U
181	0205219F	MQ-9 UAV	07	122,919	106,885	85,135	U
182	0205671F	Joint Counter RCIED Electronic Warfare	07	3,854	4,080	3,111	U
183	0207040F	Multi-Platform Electronic Warfare Equipment	07			36,607	U
184	0207131F	A-10 Squadrons	07	25,533	24,490	39,224	U

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185	0207133F	F-16 Squadrons	07	179,655	202,498	224,573	U
186	0207134F	F-15E Squadrons	07	640,124	288,381	239,616	U
187	0207136F	Manned Destructive Suppression	07	15,044	14,933	15,855	U
188	0207138F	F-22A Squadrons	07	537,232	663,825	647,296	U
189	0207142F	F-35 Squadrons	07	94,731	114,621	69,365	U
190	0207146F	F-15EX	07		159,470	118,126	U
191	0207161F	Tactical AIM Missiles	07	10,012	19,382	32,974	U
192	0207163F	Advanced Medium Range Air-to-Air Missile (AMRAAM)	07	53,681	51,705	51,288	U
193	0207227F	Combat Rescue - Pararescue	07	281	668	852	U
194	0207247F	AF TENCAP	07	22,115	18,820	23,685	U
195	0207249F	Precision Attack Systems Procurement	07	10,395	9,244	12,083	U
196	0207253F	Compass Call	07	30,687	15,825	91,266	U
197	0207268F	Aircraft Engine Component Improvement Program	07	108,446	125,666	103,715	U
198	0207325F	Joint Air-to-Surface Standoff Missile (JASSM)	07	73,510	70,663	117,325	U
199	0207327F	Small Diameter Bomb (SDB)	07		20,780	27,109	U
200	0207410F	Air & Space Operations Center (AOC)	07	110,651	51,094	3	U
201	0207412F	Control and Reporting Center (CRC)	07	6,642	16,012	9,875	U
202	0207417F	Airborne Warning and Control System (AWACS)	07	67,341	123,925	171,014	U
203	0207418F	AFSPECWAR - TACP	07	2,372	4,215	4,598	U
205	0207431F	Combat Air Intelligence System Activities	07	13,547	16,534	21,863	U
206	0207438F	Theater Battle Management (TBM) C4I	07		7,844	7,905	U

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207	0207439F	Electronic Warfare Integrated Reprogramming (EWIR)	07			15,000	U
208	0207444F	Tactical Air Control Party-Mod	07	4,019	12,882	13,081	U
209	0207452F	DCAPES	07	19,180	14,789	4,305	U
210	0207521F	Air Force Calibration Programs	07		1,966	1,984	U
211	0207522F	Airbase Air Defense Systems (ABADS)	07			7,392	U
212	0207573F	National Technical Nuclear Forensics	07	1,723	395	1,971	U
213	0207590F	Seek Eagle	07	28,175	29,626	30,539	U
214	0207601F	USAF Modeling and Simulation	07	15,243	17,634	17,110	U
215	0207605F	Wargaming and Simulation Centers	07	4,158	6,341	7,535	U
216	0207610F	Battlefield Abn Comm Node (BACN)	07	25,960	6,815	32,008	U
217	0207697F	Distributed Training and Exercises	07	4,146	3,384	4,007	U
218	0208006F	Mission Planning Systems	07	69,232	91,601	92,557	U
219	0208007F	Tactical Deception	07	7,173		489	U
220	0208064F	OPERATIONAL HQ - CYBER	07	7,335	5,493	2,115	U
221	0208087F	Distributed Cyber Warfare Operations	07	67,725	68,154	72,487	U
222	0208088F	AF Defensive Cyberspace Operations	07	37,309	30,108	18,449	U
223	0208097F	Joint Cyber Command and Control (JCC2)	07	11,306	38,410	79,079	U
224	0208099F	Unified Platform (UP)	07	90,002	84,491	101,893	U
228	0208288F	Intel Data Applications	07	1,156	1,224	493	U
229	0301025F	GeoBase	07	2,623	2,762	2,782	U
230	0301112F	Nuclear Planning and Execution System (NPES)	07	42,719	32,699		U

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231	0301113F	Cyber Security Intelligence Support	07			5,224	U
238	0301401F	Air Force Space and Cyber Non-Traditional ISR for Battlespace Awareness	07	3,575	1,382	2,463	U
239	0302015F	E-4B National Airborne Operations Center (NAOC)	07	58,059	3,462	26,331	U
240	0303131F	Minimum Essential Emergency Communications Network (MEECN)	07	13,132	44,640	20,700	U
241	0303133F	High Frequency Radio Systems	07	15,689			U
242	0303140F	Information Systems Security Program	07	26,732	10,351	8,032	U
243	0303142F	Global Force Management - Data Initiative	07	2,129	1,344	452	U
244	0303248F	All Domain Common Platform	07			64,000	U
246	0304260F	Airborne SIGINT Enterprise	07	85,157	127,876	97,546	U
247	0304310F	Commercial Economic Analysis	07	3,305	4,035	3,770	U
250	0305015F	C2 Air Operations Suite - C2 Info Services	07	9,022			U
251	0305020F	CCMD Intelligence Information Technology	07	1,121	1,646	1,663	U
252	0305022F	ISR Modernization & Automation Dvmt (IMAD)	07	19,000	19,230	18,888	U
253	0305099F	Global Air Traffic Management (GATM)	07	4,404	4,637	4,672	U
254	0305103F	Cyber Security Initiative	07		383	290	U
255	0305111F	Weather Service	07	34,292	36,573	26,228	U
256	0305114F	Air Traffic Control, Approach, and Landing System (ATCAL)	07	8,394	6,541	8,749	U
257	0305116F	Aerial Targets	07	8,761	448	1,528	U
260	0305128F	Security and Investigative Activities	07	409	431	223	U
261	0305145F	Arms Control Implementation	07	40,177			U
262	0305146F	Defense Joint Counterintelligence Activities	07	6,858	4,881	8,733	U

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264	0305179F	Integrated Broadcast Service (IBS)	07	8,728	8,848	21,335	U
265	0305202F	Dragon U-2	07	36,389	36,593	17,146	U
266	0305205F	Endurance Unmanned Aerial Vehicles	07	15,000			U
267	0305206F	Airborne Reconnaissance Systems	07	137,157	123,287	71,791	U
268	0305207F	Manned Reconnaissance Systems	07	11,787	14,684	14,799	U
269	0305208F	Distributed Common Ground/Surface Systems	07	25,009	14,126	24,568	U
270	0305220F	RQ-4 UAV	07	191,733	163,291	83,124	U
271	0305221F	Network-Centric Collaborative Targeting	07	10,757	15,022	17,224	U
272	0305238F	NATO AGS	07	32,567	36,664	19,473	U
273	0305240F	Support to DCGS Enterprise	07	37,774	33,486	40,421	U
274	0305600F	International Intelligence Technology and Architectures	07	13,515	17,283	14,473	U
275	0305881F	Rapid Cyber Acquisition	07	4,223	4,254	4,326	U
276	0305984F	Personnel Recovery Command & Ctrl (PRC2)	07	2,057	2,203	2,567	U
277	0307577F	Intelligence Mission Data (IMD)	07	8,614	6,266	6,169	U
278	0401115F	C-130 Airlift Squadron	07	89,532	41,896	9,752	U
279	0401119F	C-5 Airlift Squadrons (IF)	07	9,883	30,560	17,507	U
280	0401130F	C-17 Aircraft (IF)	07	20,653	9,935	16,360	U
281	0401132F	C-130J Program	07	6,919	10,656	14,112	U
282	0401134F	Large Aircraft IR Countermeasures (LAIRCM)	07	5,247	5,497	5,540	U
283	0401218F	KC-135s	07		4,583	3,564	U
284	0401219F	KC-10s	07	19			U

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285	0401318F	CV-22	07	17,355	18,385	17,189	U
286	0408011F	Special Tactics / Combat Control	07	3,543	7,659	6,640	U
287	0702207F	Depot Maintenance (Non-IF)	07	1,821			U
288	0708055F	Maintenance, Repair & Overhaul System	07	9,239	24,468	26,921	U
289	0708610F	Logistics Information Technology (LOGIT)	07	10,133	33,186	7,071	U
290	0708611F	Support Systems Development	07	522	11,816		U
291	0804743F	Other Flight Training	07	2,054	1,330	1,999	U
292	0808716F	Other Personnel Activities	07	10			U
293	0901202F	Joint Personnel Recovery Agency	07	1,985	2,088	1,841	U
294	0901218F	Civilian Compensation Program	07	3,809	3,862	3,560	U
295	0901220F	Personnel Administration	07	4,265	1,581	3,368	U
296	0901226F	Air Force Studies and Analysis Agency	07	1,390	1,195	1,248	U
297	0901538F	Financial Management Information Systems Development	07	8,983	6,993	4,852	U
298	0901554F	Defense Enterprise Acntng and Mgt Sys (DEAMS)	07	40,239	40,564		U
299	1201017F	Global Sensor Integrated on Network (GSIN)	07	3,532			U
300	1201921F	Service Support to STRATCOM - Space Activities	07	952	991		U
301	1202140F	Service Support to SPACECOM Activities	07	11,429	8,983	6,737	U
302	1203001F	Family of Advanced BLoS Terminals (FAB-T)	07	173,903			U
303	1203110F	Satellite Control Network (SPACE)	07	54,850			U
305	1203173F	Space and Missile Test and Evaluation Center	07	5,322			U
306	1203174F	Space Innovation, Integration and Rapid Technology Development	07	36,890			U

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307	1203182F	Spacelift Range System (SPACE)	07	20,128			U
308	1203265F	GPS III Space Segment	07	47,178			U
309	1203400F	Space Superiority Intelligence	07	14,428			U
310	1203614F	JSpOC Mission System	07	82,044			U
311	1203620F	National Space Defense Center	07	2,649			U
312	1203873F	Ballistic Missile Defense Radars	07	15,335			U
313	1203913F	NUDET Detection System (SPACE)	07	49,300			U
314	1203940F	Space Situation Awareness Operations	07	16,228			U
315	1206423F	Global Positioning System III - Operational Control Segment	07	439,560			U
316	1206770F	Enterprise Ground Services	07	114,824			U
9999	9999999999	Classified Programs		17,682,064	15,023,205	15,868,973	U
		Operational Systems Development		24,069,528	20,505,963	21,705,541	
317	0608158F	Strategic Mission Planning and Execution System - Software Pilot Program	08			96,100	U
318	0608410F	Air & Space Operations Center (AOC) - Software Pilot Program	08			186,915	U
319	0608920F	Defense Enterprise Accounting and Management System (DEAMS) - Software Pilot Pro	08			135,263	U
		Software and Digital Technology Pilot Programs				418,278	
Total Research, Development, Test & Eval, AF				45,801,963	36,360,842	39,184,328	

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1. COMPONENT AFGSC	FY 2020 MILITARY CONSTRUCTION PROJECT DATA (computer generated)		2. DATE 09 2020		
3. INSTALLATION, SITE AND LOCATION Vandenberg AFB, California		4. PROJECT TITLE Modernization Repair of Bldg 1818 for GBSD Proof Load Test Facility (PLTF)			
5. PROGRAM ELEMENT 65230F	6. CATEGORY CODE 214-469	7. RPSUID/PROJECT NUMBER XXX/XXXXXXXXXX	8. PROJECT COST (\$000) 2,990		
9. COST ESTIMATES					
ITEM		U/M	QTY	UNIT COST	COST (\$000)
Modernization Repair of Bldg 1818 (EEIC					2,600
Demolition		LS			(300)
Renovation		LS			(2,300)
(included above)					
CYBERSECURITY OF FACILITY-RELATED CONTROL SYS		LS			(000)
UTILITIES		LS			(XXX)
SITE IMPROVEMENTS		LS			(XXX)
COMMUNICATIONS		LS			(XXX)
SUBTOTAL					2,600
CONTINGENCY (5.0%)					130
TOTAL CONTRACT COST					2,730
SUPERVISION, INSPECTION AND OVERHEAD (5.7%)					156
DESIGN/BUILD - DESIGN COST (4.0% OF SUBTOTAL)					104
TOTAL REQUEST					2,990
TOTAL REQUEST (ROUNDED)					2,990
EQUIPMENT FROM OTHER APPROPRIATIONS (NON-ADD)					(100)
10. Description of Proposed Work:					
<p>Renovate an existing, now abandoned, proof load testing facility consisting of a below grade pit, above ground control room, and supporting utilities and pavements. The facility will be inspected for presence of hazardous materials, and cleaned and abated as necessary. Doors, hatches, and covers, pylons, anchor and tie-down points, and winches and lifting equipment will be inspected and repaired, or reconfigured as necessary to support the new GBSD system. Existing electrical and mechanical systems repaired or reconfigured to meet the requirements of the GBSD system. The lightning protection, cathodic protection, and grounding systems will be inspected, tested, and repaired as necessary.</p>					

1. COMPONENT AFGSC	FY 2020 MILITARY CONSTRUCTION PROJECT DATA (computer generated)		2. DATE 09 2020
3. INSTALLATION, SITE AND LOCATION Vandenberg AFB, California		4. PROJECT TITLE Modernization Repair of Bldg 1818 for GBSD Proof Load Test Facility (PLTF)	
5. PROGRAM ELEMENT 65230F	6. CATEGORY CODE 214-469	7. RPSUID/PROJECT NUMBER XXX/XXXXXXXXXX	8. PROJECT COST (\$000) 2,990
<p>11. Requirement: SM Adequate: 0 SM Substandard: SM</p> <p>PROJECT: Modernize Building 1818 for GBSD Proof Load Test Facility (PLTF)</p> <p>REQUIREMENT: Proof load testing is required to ensure that all items used for transport and lifting can perform to required standards and specifications. The GBSD Proof Load Testing Facility is designed to test the integrity of the Transport/Erector and Payload Transporter vehicles and is essential to achieving critical GBSD program milestones in support of this new weapon system.</p> <p>CURRENT SITUATION: An existing, abandoned-in-place, proof load test facility used in support of a previous missile system exists, but needs to be refurbished, reconfigured, and modernized to support the specific requirements of the GBSD system. .</p> <p>IMPACT IF NOT PROVIDED: Proof load testing for the GBSD missile system can't be accomplished and GBSD program milestones jeopardized.</p> <p>ADDITIONAL: This project does not change the functional purpose of the facility as defined by AFI 32-1020, Planning and Programming Built Infrastructure Projects.</p> <p>This project meets the scope/criteria specified in Air Force Manual 32-1084, "Facility Requirements" to satisfy the unique unclassified and secure office and test & evaluation space requirements for the GBSD weapons system. Sustainable principles, to include life-cycle cost-effective practices, will be integrated into the design, development, and construction of the project in accordance with Unified Facility Criteria 1-200-02. This includes preparation of a life-cycle cost analysis for energy consuming systems, renewable energy generating systems, whenever life-cycle cost effective is selected as the reason any requirement of Unified Facility Criteria 1-200-02 is partially compliant or not applicable.</p> <p>[Flood-Plain Statement] [FYDP Statement] [Master Plan Statement] to be completed by local BCE</p> <p>XX Wing Base Civil Engineer: (XXX) XXX-XXXX. (to be completed by local BCE)</p> <p>JOINT USE CERTIFICATION: [USE APPROPRIATE JOINT USE CERTIFICATION] This facility can be used by other components on an "as available" basis; however, the scope of the project is based on Air Force requirements.</p>			
<p>12. Supplemental Data:</p> <p>Communications & IT Equipment 3400</p>			

1. COMPONENT AFGSC	FY 2020 MILITARY CONSTRUCTION PROJECT DATA (computer generated)		2. DATE 09 2020
3. INSTALLATION, SITE AND LOCATION Vandenberg AFB, California		4. PROJECT TITLE Modernization Repair of Bldg 1818 for GBSD Proof Load Test Facility (PLTF)	
5. PROGRAM ELEMENT 65230F	6. CATEGORY CODE 214-469	7. RPSUID/PROJECT NUMBER XXX/XXXXXXXXXX	8. PROJECT COST (\$000) 2,990
Furniture, fixtures, & Equipment		3400	

Current Site Layout Remains the Same:



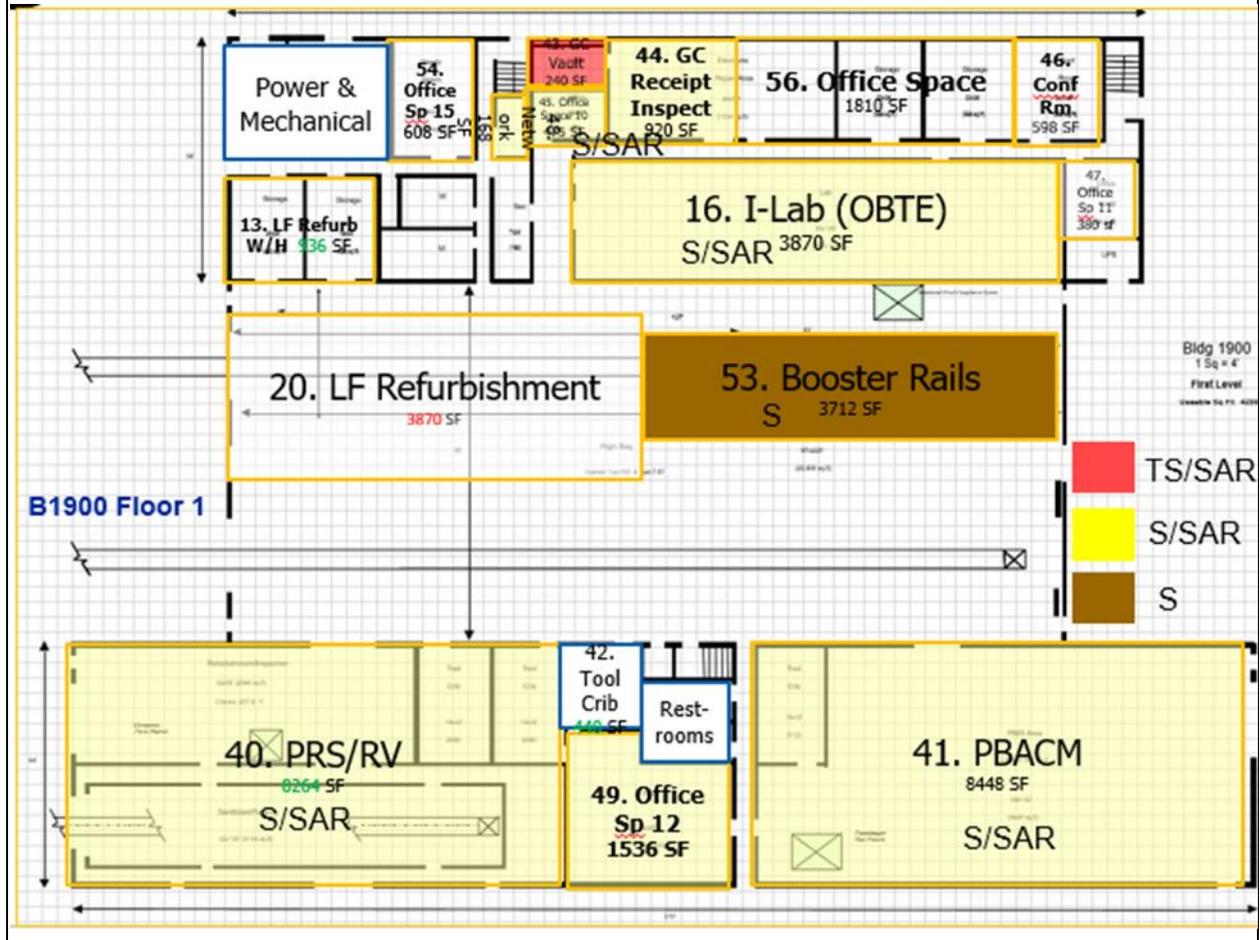
1. COMPONENT AFGSC	FY 2020 MILITARY CONSTRUCTION PROJECT DATA (computer generated)		2. DATE 09 2020		
3. INSTALLATION, SITE AND LOCATION Vandenberg AFB, California			4. PROJECT TITLE Modernization Repair of Bldg 1900 for GBSD Contractor Support Area (CSA)		
5. PROGRAM ELEMENT 65230F	6. CATEGORY CODE XXX-XXX	7. RPSUID/PROJECT NUMBER XXX/XXXXXXXXXX	8. PROJECT COST (\$000) 25,060		
9. COST ESTIMATES					
ITEM		U/M	QTY	UNIT COST	COST (\$000)
Modernization Repair of Bldg 1900 (EEIC 522)					21,794
Demolition		LS			(577)
Renovation		LS			(21,217)
(Included above)					
CYBERSECURITY OF FACILITY-RELATED CONTROL SYS		LS			(XXX)
UTILITIES		LS			(XXX)
SITE IMPROVEMENTS		LS			(XXX)
COMMUNICATIONS		LS			(XXX)
SUBTOTAL					21,794
CONTINGENCY (5.0%)					1,090
TOTAL CONTRACT COST					22,884
SUPERVISION, INSPECTION AND OVERHEAD (5.7%)					1,304
DESIGN/BUILD - DESIGN COST (4.0% OF SUBTOTAL)					872
TOTAL REQUEST					25,060
TOTAL REQUEST (ROUNDED)					25,060
EQUIPMENT FROM OTHER APPROPRIATIONS (NON-ADD)					(5,985)
10. Description of Proposed Work: Renovate an existing 5,393 gross SM (58,030 SF), steel- frame, metal-skin structure consisting of high-bay areas, shops, and administrative area to accommodate the Ground Based Strategic Deterrent (GBSD) Contractor Support Area (CSA), providing unclassified and secure administrative & warehouse areas, and various test & evaluation functions to include PBACM, PRS/Re-entry Vehicle, Launch Facility Refurbishment, I-LAB (OBTE), Receipt Inspection, and space for Booster Rails.					
A total of approximately 5,177 SM (55,701 SF) of existing space within the building will be renovated, including approximately 1,270 SM (13,662 SF) for unclassified offices and work areas, and approximately 2,576 SM (27,715 SF) upgraded to secure (ICD compliant) offices and various functions requiring a higher classification levels to support the GBSD program. Where necessary, walls will be painted, floor coverings and suspended ceilings replaced, and the existing electrical distribution panels and circuits, plumbing, the HVAC, and the Fire Detection, Reporting, and Suppression					

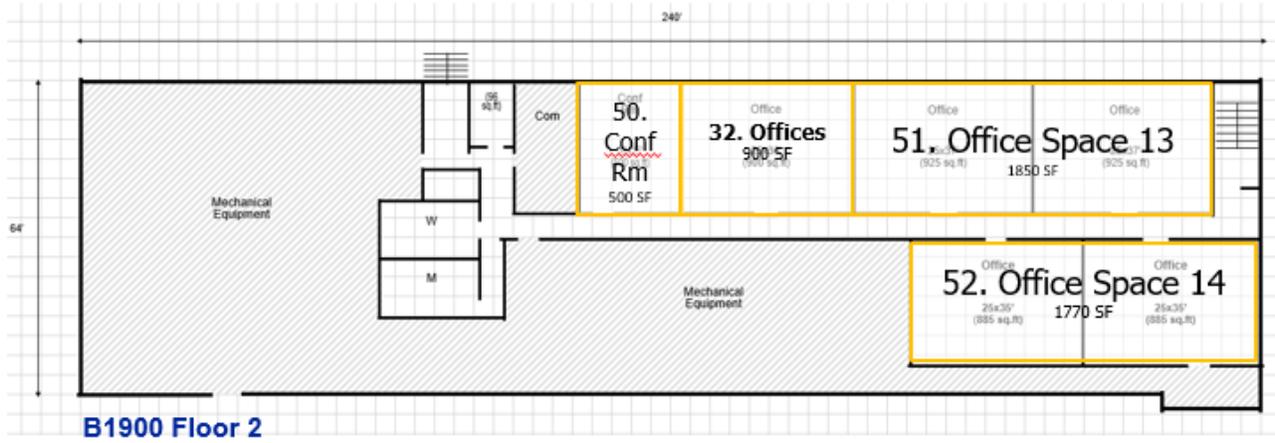
1. COMPONENT AFGSC	FY 2020 MILITARY CONSTRUCTION PROJECT DATA (computer generated)		2. DATE 09 2020
3. INSTALLATION, SITE AND LOCATION Vandenberg AFB, California		4. PROJECT TITLE Modernization Repair of Bldg 1900 for GBSD Contractor Support Area (CSA)	
5. PROGRAM ELEMENT 65230F	6. CATEGORY CODE XXX-XXX	7. RPSUID/PROJECT NUMBER XXX/XXXXXXXXXX	8. PROJECT COST (\$000) 25,060
<p>(FDRS) systems will be reconfigured to comply with current standards and to conform to the new interior layout for the Contractor Support functions.</p> <p>The existing boilers, boiler stack, and ventilating, temperature and humidity control systems will be repaired or replaced as necessary to improve efficiency and meet current standards, and conditioned air provided to support communications rooms and enclosed administrative areas with high equipment heat loads.</p> <p>The currently inoperative, existing bridge cranes will be repaired or replaced, and existing roll-up doors, and roofing system will be repaired. One existing 3000KVA transformer requires replacement, and the existing air compressors will be inspected, and repaired or replaced as necessary, and the existing air distribution system and drops reconfigured to support the new layout.</p> <p>The existing Cathodic Protection and Lightning Protection systems will be inspected and repaired as necessary.</p> <p>On the exterior of the building the existing perimeter fencing and gates, and the existing paving will be repaired as necessary and sealed and striped.</p> <p>This project will be designed as permanent construction in accordance with the Department of Defense Unified Facilities Criteria 1-200-01, and in compliance with the Vandenberg AFB Installation Design Guide (IDG) standards, criteria, codes, and the standards referenced within.</p> <p>Air Conditioning (comm & high-load computer/equipment/lab areas): 25 Tons</p>			
<p>11. Requirement: 5,393 SM Adequate: 0 SM Substandard: 5,393 SM</p> <p>PROJECT: Modernize Building 1900 for GBSD Contractor Support Area (CSA)</p> <p>REQUIREMENT: As an integral part of the GBSD team, the Contractor developing the GBSD weapons system requires both unclassified and secure space for offices, labs, and work areas to support testing, evaluation, and deployment. GBSD Contractor office, collaboration, and test & evaluation labs and refurbishment shops, supported by appropriate level systems, are essential to achieving critical GBSD program milestones in support of this new weapon system.</p> <p>CURRENT SITUATION: There is no existing facility configured to provide the administrative areas needed to support the GBSD Contractor Support Area. Existing building 1900 can provide the gross area, but due to its age, deferred maintenance and repair, outdated and inefficient building systems and existing interior configuration, and lack of adequate secure (ISC/ICD 705 compliant) space, the building requires modernization which will be accomplished under this project.</p>			

1. COMPONENT AFGSC	FY 2020 MILITARY CONSTRUCTION PROJECT DATA (computer generated)		2. DATE 09 2020				
3. INSTALLATION, SITE AND LOCATION Vandenberg AFB, California		4. PROJECT TITLE Modernization Repair of Bldg 1900 for GBSD Contractor Support Area (CSA)					
5. PROGRAM ELEMENT 65230F	6. CATEGORY CODE XXX-XXX	7. RPSUID/PROJECT NUMBER XXX/XXXXXXXXXX	8. PROJECT COST (\$000) 25,060				
<p>IMPACT IF NOT PROVIDED: Unclassified and secure administrative space for the GBSD Contractor will not be available to support achievement of GBSD program milestones.</p> <p>ADDITIONAL: This project does not change the functional purpose of the facility as defined by AFI 32-1020, Planning and Programming Built Infrastructure Projects.</p> <p>This project meets the scope/criteria specified in Air Force Manual 32-1084, "Facility Requirements" to satisfy the unique unclassified and secure office and test & evaluation space requirements for the GBSD weapons system. Sustainable principles, to include life-cycle cost-effective practices, will be integrated into the design, development, and construction of the project in accordance with Unified Facility Criteria 1-200-02. This includes preparation of a life-cycle cost analysis for energy consuming systems, renewable energy generating systems, whenever life-cycle cost effective is selected as the reason any requirement of Unified Facility Criteria 1-200-02 is partially compliant or not applicable.</p> <p>[Flood-Plain Statement] [FYDP Statement] [Master Plan Statement] to be completed by local BCE</p> <p>XX Wing Base Civil Engineer: (XXX) XXX-XXXX. (to be completed by local BCE)</p> <p>JOINT USE CERTIFICATION: [USE APPROPRIATE JOINT USE CERTIFICATION] This facility can be used by other components on an "as available" basis; however, the scope of the project is based on Air Force requirements.</p>							
<p>12. Supplemental Data:</p> <table border="0"> <tr> <td>Communications & IT Equipment</td> <td style="text-align: right;">3400</td> </tr> <tr> <td>Furniture, fixtures, & Equipment</td> <td style="text-align: right;">3400</td> </tr> </table>				Communications & IT Equipment	3400	Furniture, fixtures, & Equipment	3400
Communications & IT Equipment	3400						
Furniture, fixtures, & Equipment	3400						

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3. INSTALLATION, SITE AND LOCATION Vandenberg AFB, California		4. PROJECT TITLE Modernization Repair of Bldg 1900 for GBSD Contractor Support Area (CSA)	
5. PROGRAM ELEMENT 65230F	6. CATEGORY CODE XXX-XXX	7. RPSUID/PROJECT NUMBER XXX/XXXXXXXXXX	8. PROJECT COST (\$000) 25,060

Conceptual Layout below:





1. COMPONENT AFGSC	FY 2020 MILITARY CONSTRUCTION PROJECT DATA (computer generated)		2. DATE 09 2020	
3. INSTALLATION, SITE AND LOCATION Vandenberg AFB, California		4. PROJECT TITLE Modernization & Repair of Bldg 8337 for Contractor Operated T&E Facility		
5. PROGRAM ELEMENT 65230F	6. CATEGORY CODE XXX-XXX	7. RPSUID/PROJECT NUMBER XXX/XXXXXXXXXX	8. PROJECT COST (\$000) 13,986	
9. COST ESTIMATES				
ITEM	U/M	QTY	UNIT COST	COST (\$000)
Modernization Repair of Bldg 8337 (EEIC 522)				12,132
Demolition	LS		730	(730)
Repair	LS		11,402	(11,402)
CYBERSECURITY OF FACILITY-RELATED CONTROL SYS	LS			(XXX)
UTILITIES	LS			(XXX)
SITE IMPROVEMENTS	LS			(XXX)
COMMUNICATIONS	LS			(XXX)
SUBTOTAL				12,132
CONTINGENCY (5.0%)				607
TOTAL CONTRACT COST				12,739
SUPERVISION, INSPECTION AND OVERHEAD (5.7%)				762
DESIGN/BUILD - DESIGN COST (4.0% OF SUBTOTAL)				485
TOTAL REQUEST				13,986
TOTAL REQUEST (ROUNDED)				13,986
EQUIPMENT FROM OTHER APPROPRIATIONS (NON-ADD)				(21,251)
<p>10. Description of Proposed Work: Renovate an existing 5,585 gross SM (60,125 gross SF), steel-frame, metal-skin structure consisting of high-bay areas, storage, maintenance/test, and office space for contractor operated test support facility. Provides unclassified and secure administrative & warehouse areas, and various test & evaluation functions to include E-Lab, Power Refrigeration & Electrical Lab (PREL), and MAPS; various shops to include Vehicle Inspection, Maintenance, and Dispatch, plus Battery, Machine, Welding, and Paint Shops, and space for Staging and Bonded Storage.</p> <p>Approximately 775 SM (8,342 SF) of existing single-story administrative space will be upgraded to secure area (ICD 705 compliant) with existing walls reconfigured to efficiently accommodate personnel, conference rooms, and secure communications hubs. Where necessary, floors will be leveled and floated, and floor coverings and suspended ceilings replaced. The existing electrical distribution panels and circuits, plumbing, HVAC, and Fire</p>				

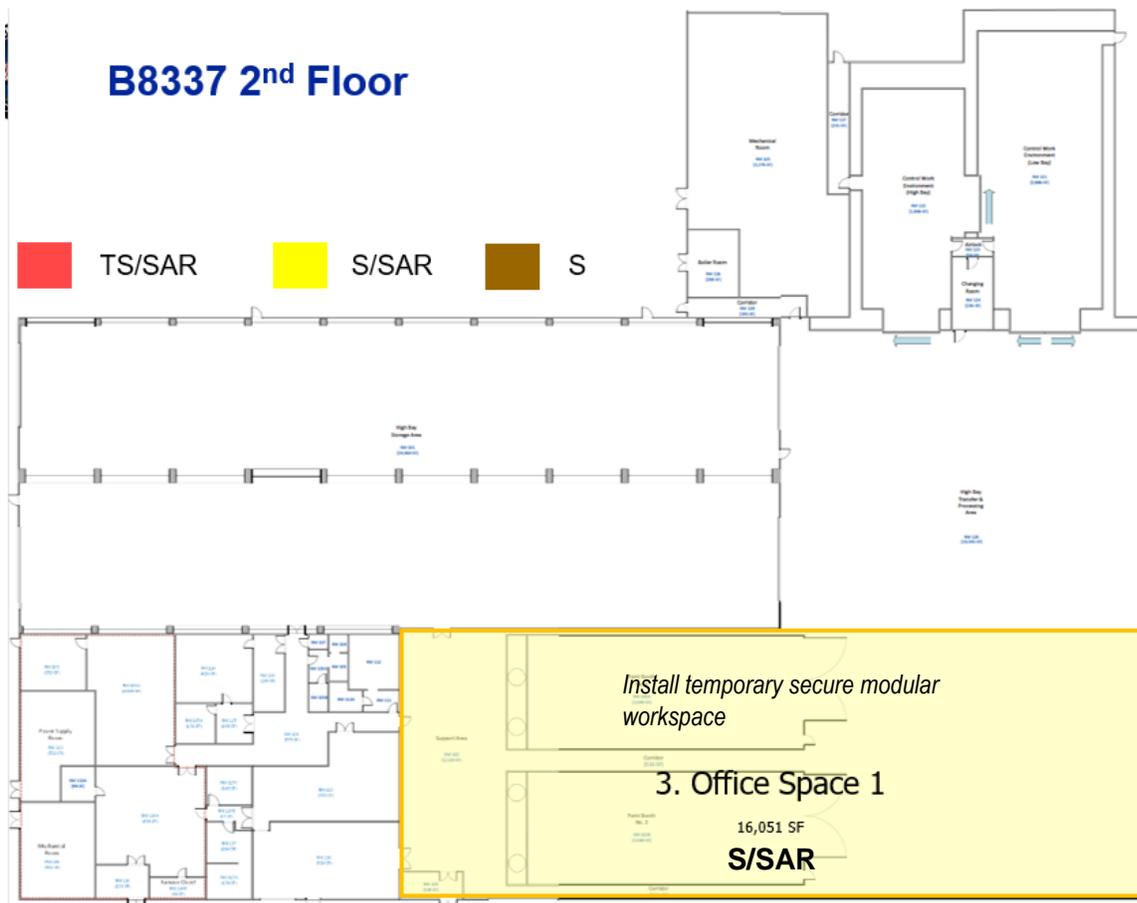
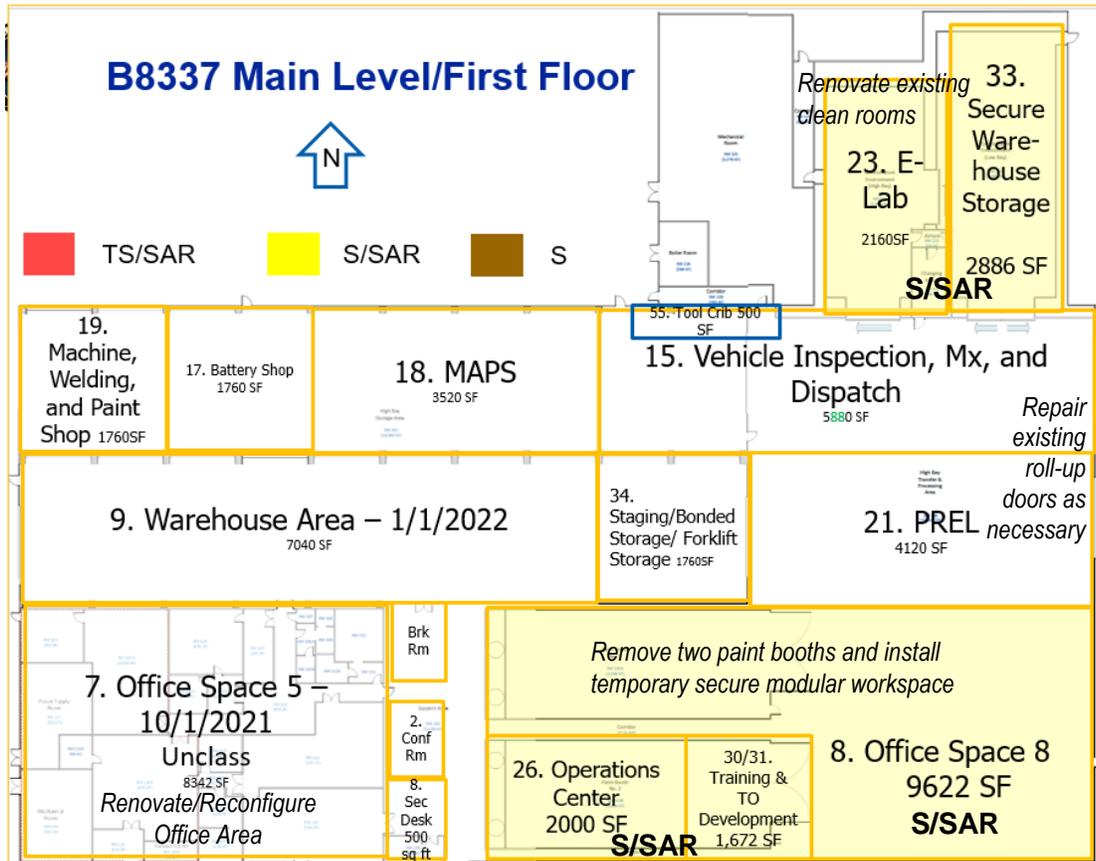
1. COMPONENT AFGSC	FY 2020 MILITARY CONSTRUCTION PROJECT DATA (computer generated)		2. DATE 09 2020
3. INSTALLATION, SITE AND LOCATION Vandenberg AFB, California		4. PROJECT TITLE Modernization & Repair of Bldg 8337 for Contractor Operated T&E Facility	
5. PROGRAM ELEMENT 65230F	6. CATEGORY CODE XXX-XXX	7. RPSUID/PROJECT NUMBER XXX/XXXXXXXXXX	8. PROJECT COST (\$000) 13,986
<p>Detection, Reporting, and Suppression (FDRS) systems will be reconfigured to comply with current standards and to conform to the new, more efficient interior layout. Conditioned air will be provided to support communications rooms and enclosed administrative areas with high equipment heat loads. The existing restrooms will be renovated and a break room relocated adjacent to an existing plumbing wall to provide a more efficient layout.</p> <p>In one of the high-bay areas, two existing, freestanding paint booths (approximately 34'W x 80'L each) will be removed and a freestanding, two-level modular structure will provide a total of approximately 2,820 SM(30,350 SF) of secure (ICD 705 compliant) area for offices, an Operations Center, and Training & TO Development. A separate HVAC system, purchased and installed as part of the freestanding modular structure is envisioned to maintain temperature within the two-level modular area.</p> <p>Two existing high-bay clean rooms totaling approximately 470 SM (5,046 SF) will be modified to meet secure (ICD 705) standards to accommodate a modular E-Lab function and provide Secure Warehouse/Storage space.</p> <p>Additional high-bay spaces totaling approximately 2,074 SM (22,320 SF) will be renovated and reconfigured, and lighting and utilities repaired and reconfigured as necessary to support various shops, labs, vehicle inspection & maintenance functions.</p> <p>Existing personnel doors and roll-up doors will be repaired or replaced as necessary, and the existing, double-door with vestibule entrance will be reconfigured to provide a controlled entry point.</p> <p>This project will be designed as permanent construction in accordance with the Department of Defense Unified Facilities Criteria 1-200-01, and in compliance with the Vandenberg AFB Installation Design Guide (IDG) standards, criteria, codes, and the standards referenced within.</p> <p>Air Conditioning (comm & high-load computer/equipment/lab areas): 25 Tons</p>			
<p>11. Requirement: 5,585 SM Adequate: 0 SM Substandard: 5,585 SM</p> <p>PROJECT: Modernize Building 8337 for Contractor Operated GBSD Test Support Facility</p> <p>REQUIREMENT: This is a Government Owned, Contractor Operated test support facility to provide temporary associated contractor Test & Evaluation labs and functional space until the completion of new mission MILCON projects by the end of FY25. The contractor requires unclassified and secure (ICD/ICS 705 compliant) office and collaboration space, supported by appropriate level network systems, to allow cross-functional teams to work effectively at</p>			

1. COMPONENT AFGSC	FY 2020 MILITARY CONSTRUCTION PROJECT DATA (computer generated)		2. DATE 09 2020				
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5. PROGRAM ELEMENT 65230F	6. CATEGORY CODE XXX-XXX	7. RPSUID/PROJECT NUMBER XXX/XXXXXXXXXX	8. PROJECT COST (\$000) 13,986				
<p>various levels, plus warehouse/storage space, and space for various lab functions and shops.</p> <p>CURRENT SITUATION: There is no existing facility configured to provide the administrative areas needed to support the Contractor operated Test & Evaluation labs and functions. Existing building 8337 can provide the gross area and is currently available, but due to its age, deferred maintenance and repair, outdated and inefficient building systems and existing interior configuration, and lack of secure (ICS/ICD 705 compliant) space, the building requires modernization which will be accomplished under this project.</p> <p>IMPACT IF NOT PROVIDED: Failure to provide capable Contractor operated Test & Evaluation labs and functional areas will result in the programs ability to meet Pathfinder Start and First Flight critical milestones. Causing a day-to-day slip in meeting Initial Operational Capability (IOC).</p> <p>ADDITIONAL: This project does not change the functional purpose of the facility as defined by AFI 32-1020, Planning and Programming Built Infrastructure Projects.</p> <p>This project meets the scope/criteria specified in Air Force Manual 32-1084, "Facility Requirements" to satisfy the unique unclassified and secure office and test & evaluation space requirements for the GBSD weapons system. Sustainable principles, to include life-cycle cost-effective practices, will be integrated into the design, development, and construction of the project in accordance with Unified Facility Criteria 1-200-02. This includes preparation of a life-cycle cost analysis for energy consuming systems, renewable energy generating systems, whenever life-cycle cost effective is selected as the reason any requirement of Unified Facility Criteria 1-200-02 is partially compliant or not applicable.</p> <p>[Flood-Plain Statement] [FYDP Statement] [Master Plan Statement] to be completed by local BCE</p> <p>XX Wing Base Civil Engineer: (XXX) XXX-XXXX. (to be completed by local BCE)</p> <p>JOINT USE CERTIFICATION: [USE APPROPRIATE JOINT USE CERTIFICATION] This facility can be used by other components on an "as available" basis; however, the scope of the project is based on Air Force requirements.</p>							
<p>12. Supplemental Data:</p> <table border="0"> <tr> <td>Communications & IT Equipment</td> <td style="text-align: right;">3400</td> </tr> <tr> <td>Furniture, fixtures, & Equipment</td> <td style="text-align: right;">3400</td> </tr> </table>				Communications & IT Equipment	3400	Furniture, fixtures, & Equipment	3400
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3. INSTALLATION, SITE AND LOCATION Vandenberg AFB, California		4. PROJECT TITLE Modernization & Repair of Bldg 8337 for Contractor Operated T&E Facility	
5. PROGRAM ELEMENT 65230F	6. CATEGORY CODE XXX-XXX	7. RPSUID/PROJECT NUMBER XXX/XXXXXXXXXX	8. PROJECT COST (\$000) 13,986
Free-standing Modular w/ stairs (ICD705)		3400	

Site Plan - Bldg 8337





1. COMPONENT AFGSC	FY 2020 MILITARY CONSTRUCTION PROJECT DATA (computer generated)		2. DATE 09 2020		
3. INSTALLATION, SITE AND LOCATION Vandenberg SFB, California		4. PROJECT TITLE Modernization & Repair of Bldg 8339 for Contractor Operated T&E Facilities			
5. PROGRAM ELEMENT 65230F	6. CATEGORY CODE XXX-XXX	7. RPSUID/PROJECT NUMBER XXX/XXXXXXXXXX	8. PROJECT COST (\$000) 4,586		
9. COST ESTIMATES					
ITEM		U/M	QTY	UNIT COST	COST (\$000)
Modernization Repair of Bldg 8339 (EEIC 522)					XXXX
Demolition		LS		391	(391)
Repair		LS		3,597	(3,597)
CYBERSECURITY OF FACILITY-RELATED CONTROL SYS		LS			(XXX)
UTILITIES		LS			(XXX)
SITE IMPROVEMENTS		LS			(XXX)
COMMUNICATIONS		LS			(XXX)
SUBTOTAL					3,988
CONTINGENCY (5.0%)					199
TOTAL CONTRACT COST					4,188
SUPERVISION, INSPECTION AND OVERHEAD (5.7%)					239
DESIGN/BUILD - DESIGN COST (4.0% OF SUBTOTAL)					159
TOTAL REQUEST					4,586
TOTAL REQUEST (ROUNDED)					4,586
EQUIPMENT FROM OTHER APPROPRIATIONS (NON-ADD)					(8,943)
10. Description of Proposed Work: Renovate an existing 1,672 SM gross (18,000 SF) two-story, steel-frame, metal-skin structure to provide for contractor operated secure (ICD/ICS 705 compliant) administrative space, launch support, telemetry monitoring and analysis, collaboration areas, and communications rooms for the Ground Based Strategic Deterrent (GBSD) Contractor Support Area (CSA) during test and evaluation. Interior renovations include removal and reconfiguration of existing, non-load bearing partition walls to improve efficiency, provide secure temporary, modular secure workspace and maximize use of existing floor space within the existing footprint. Some areas on the ground floor will be floated and leveled, and flooring and ceilings may be replaced throughout the building. Existing restrooms and break areas will be repaired and renovated, and existing electrical distribution panels and circuits, plumbing system, and Fire Detection, Reporting, and Suppression (FDRS) systems repaired and reconfigured to comply with current standards and to conform to the new, more efficient interior layout. The existing, non-functional boilers, two-pipe distribution system and perimeter radiators may be removed, and other					

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3. INSTALLATION, SITE AND LOCATION Vandenberg SFB, California		4. PROJECT TITLE Modernization & Repair of Bldg 8339 for Contractor Operated T&E Facilities	
5. PROGRAM ELEMENT 65230F	6. CATEGORY CODE XXX-XXX	7. RPSUID/PROJECT NUMBER XXX/XXXXXXXXXX	8. PROJECT COST (\$000) 4,586
<p>existing HVAC systems may be replaced with systems to meet current standards and provide conditioned air to communications rooms and enclosed administrative areas with high equipment heat loads. Two existing, previously covered and badly deteriorated, exterior steel stair cases will be repaired.</p> <p>This project will be designed as permanent construction in accordance with the Department of Defense Unified Facilities Criteria 1-200-01, and in compliance with the Vandenberg SFB Installation Design Guide (IDG) standards for a Group 2 facility and the criteria, codes, and standards referenced within.</p> <p>Air Conditioning (for comm & high-load computer/equipment areas): 20 Tons</p>			
<p>11. Requirement: 1,672 SM Adequate: 0 SM Substandard: 0 SM</p> <p>PROJECT: Modernize Building 8339 to provide contractor operated secure space to support T&E operations</p> <p>REQUIREMENT: This facility will be Government Owned, Contractor Operated, and will provide the necessary test support capability to meet critical Pathfinder and First Flight operations until the new mission MILCON facility is constructed by the end of FY25. This facility provides a consolidated work and collaboration space for the GBSB contractor who requires secure (ICD/ICS 705 compliant) space, supported by appropriate level network systems, to allow cross-functional teams to work effectively at various levels. Space functionality includes Telemetry Processing and Analysis, Launch Monitoring, Codes and Crypto Vault, ILCC, and Classified Processing Lab.</p> <p>CURRENT SITUATION: There is no existing facility configured to provide the needed secure space for the GBSB contractor to support initial T&E operations. Existing building 8339 can provide the gross area and is currently available, but due to its age, deferred maintenance and repair, outdated and inefficient building systems and interior configuration, and lack of secure (ISC/ICD 705 compliant) space, the building requires modernization which will be accomplished under this project.</p> <p>IMPACT IF NOT PROVIDED: Contractor operated secure administrative space is required to meet Pathfinder and First Flight critical program milestones. Failure to deliver will result in delays to meet Initial Operational Capability (IOC).</p> <p>ADDITIONAL: This project does not change the functional purpose of the facility as defined by AFI 32-1032, Planning and Programming Appropriated Fund Maintenance, Repair, and Construction Projects.</p> <p>This project meets the scope/criteria specified in Air Force Manual 32-1084, "Facility Requirements" to satisfy the unique secure administrative</p>			

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3. INSTALLATION, SITE AND LOCATION Vandenberg SFB, California		4. PROJECT TITLE Modernization & Repair of Bldg 8339 for Contractor Operated T&E Facilities					
5. PROGRAM ELEMENT 65230F	6. CATEGORY CODE XXX-XXX	7. RPSUID/PROJECT NUMBER XXX/XXXXXXXXXX	8. PROJECT COST (\$000) 4,586				
<p>space requirements to stand-up initial T&E operations.</p> <p>Sustainable principles, to include life-cycle cost-effective practices, will be integrated into the design, development, and construction of the project in accordance with Unified Facility Criteria 1-200-02. This includes preparation of a life-cycle cost analysis for energy consuming systems, renewable energy generating systems, whenever life-cycle cost effective is selected as the reason any requirement of Unified Facility Criteria 1-200-02 is partially compliant or not applicable.</p> <p>[Flood-Plain Statement] [FYDP Statement] [Master Plan Statement] to be completed by local BCE</p> <p>XX Wing Base Civil Engineer: (XXX) XXX-XXXX. (to be completed by local BCE)</p> <p>JOINT USE CERTIFICATION: [USE APPROPRIATE JOINT USE CERTIFICATION] This facility can be used by other components on an "as available" basis; however, the scope of the project is based on Air Force requirements.</p>							
<p>12. Supplemental Data:</p> <table> <tr> <td>Communications & IT Equipment</td> <td>3400</td> </tr> <tr> <td>Furniture, fixtures, & Equipment</td> <td>3400</td> </tr> </table>				Communications & IT Equipment	3400	Furniture, fixtures, & Equipment	3400
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3. INSTALLATION, SITE AND LOCATION Vandenberg SFB, California		4. PROJECT TITLE Modernization & Repair of Bldg 8339 for Contractor Operated T&E Facilities	
5. PROGRAM ELEMENT 65230F	6. CATEGORY CODE XXX-XXX	7. RPSUID/PROJECT NUMBER XXX/XXXXXXXXXX	8. PROJECT COST (\$000) 4,586



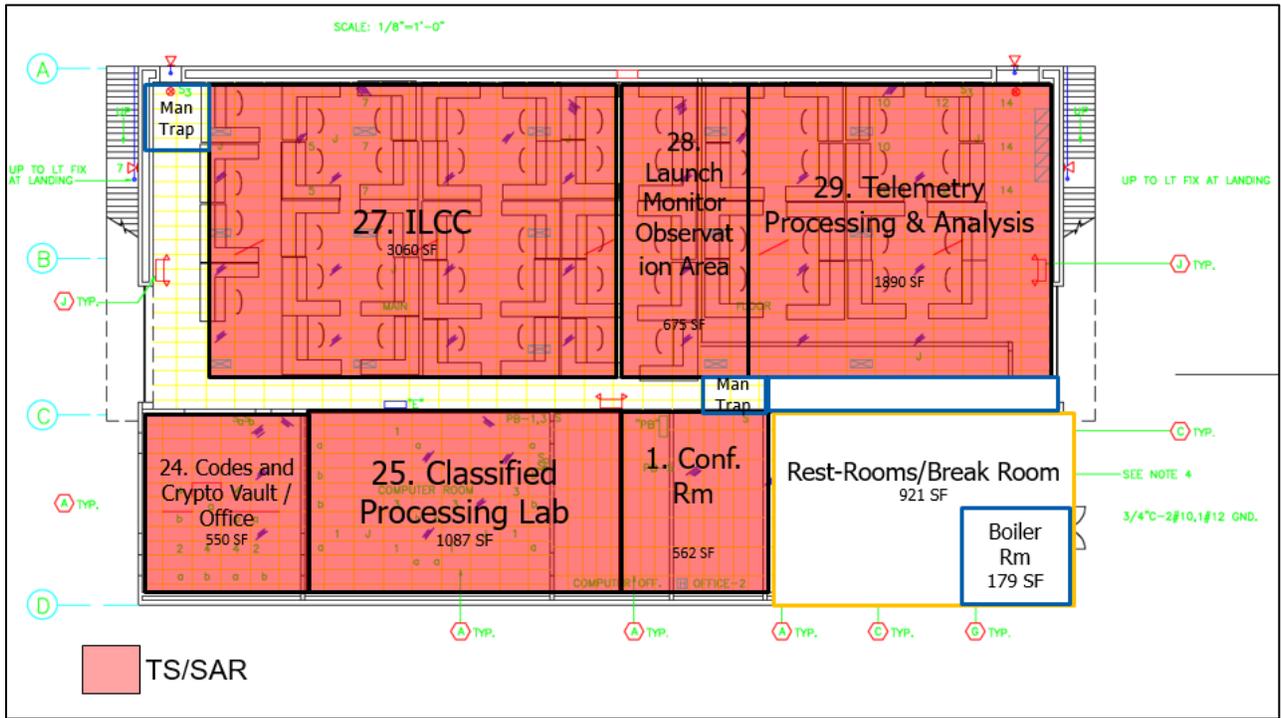


Figure 1 - Bldg. 8339, First Floor

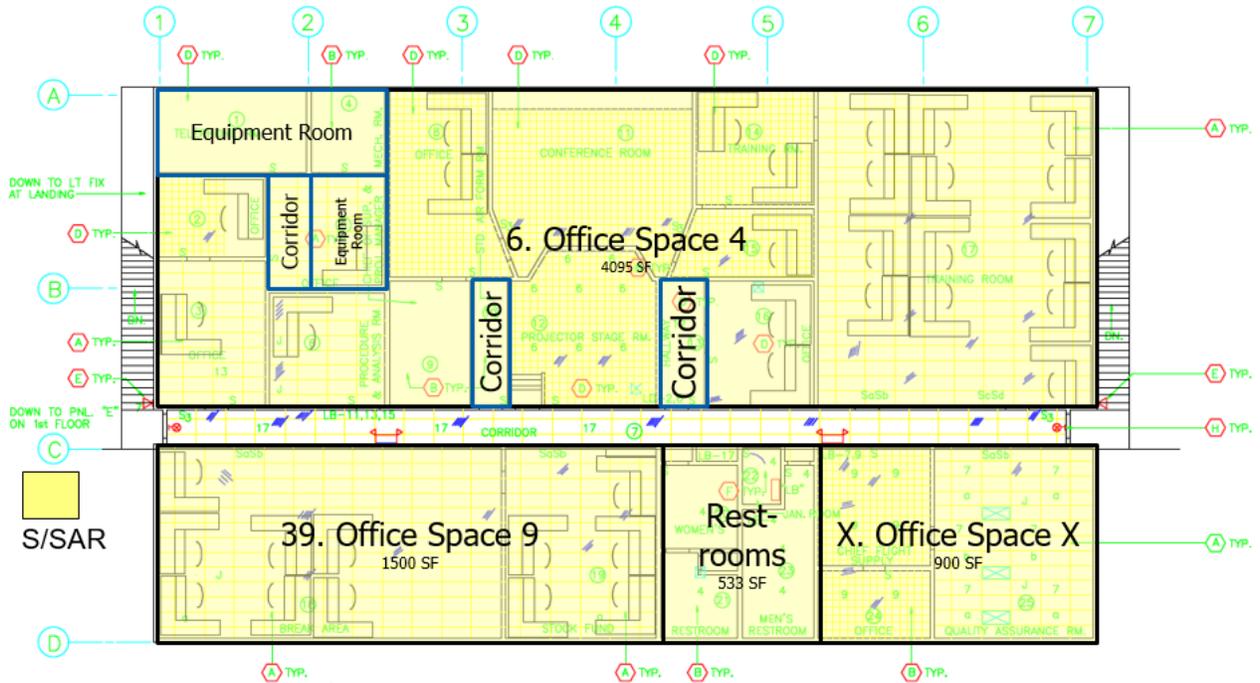


Figure 2 - Bldg. 8339, Second Floor

AIR FORCE		FY 2021 MILITARY CONSTRUCTION PROJECT DATA			2. Date	
3. INSTALLATION AND LOCATION VANDENBERG AFB, CALIFORNIA			4. PROJECT TITLE: GBSD LAUNCH CENTER			
5. PROGRAM ELEMENT 65230F		6. CATEGORY CODE 141175	7. PROJECT NUMBER 3376/XUMU21xxxxx		8. PROJECT COST (\$000) 23,000	
9. COST ESTIMATES						
Item			U/M	Quantity	Unit Cost (\$000)	Cost (\$000)
PRIMARY FACILITY GUIDED MISSILE LAUNCH CENTER (141-175)			EA	1	23,000	23,000
SUBTOTAL CONTINGENCY (5%)						
TOTAL CONTRACT COST SIOH (5.7%) DESIGN-BID-BUILD EXECUTION (4%)						
TOTAL REQUEST TOTAL REQUEST (ROUNDED) Equipment Provided from Other Appropriations (NON-ADD)						<hr/> 23,000
						<hr/> 23,000
10. DESCRIPTION OF PROPOSED CONSTRUCTION: Construct Ground Based Strategic Deterrent (GBSD) Intercontinental Ballistic Missile (ICBM) Launch Center (LC) and associated support facilities for test at existing Missile Alert Facility site D0 at Vandenberg AFB. Work at LC site includes the demolition of existing Missile Alert Facility #1450 (438SM), detached facilities and abandoned in place assets, and the construction of a new mission critical Launch Center with above and below ground structures, utilities, vehicle parking and roadway, cathodic protection, grounding and communication systems. This mission critical facility accommodates a crew of 4 personnel with 24/7 operations during preparation and test launch. The portion of the facility will meet Intelligence Community Directive (ICD) 705 technical standards. Site improvements include clearing, grubbing, grading, demolition, as applicable, paving, and storm drainage. These Facilities will be designed as permanent construction in accordance with the Department of Defense Unified Facilities Criteria 1-200-01. Sustainable principles, to include life-cycle cost-effective practices, will be integrated into the design, development, and construction of the project in accordance with Unified Facility Criteria 1-200-02. This includes preparation of a life-cycle cost analysis for energy consuming systems, renewable energy generating systems, whenever life-cycle cost effective is selected as the reason any requirement of Unified Facility Criteria 1-200-02 is partially						

AIR FORCE	FY 2021 MILITARY CONSTRUCTION PROJECT DATA		2. Date
3. INSTALLATION AND LOCATION VANDENBERG AFB, CALIFORNIA		4. PROJECT TITLE: GBSD LAUNCH CENTER	
5. PROGRAM ELEMENT 65230F	6. CATEGORY CODE 141175	7. PROJECT NUMBER 3376/XUMU21xxxx	8. PROJECT COST (\$000) 23,000
<p>compliant or not applicable. This project will comply with Department of Defense antiterrorism/force protection requirements per Unified Facility Criteria 4-010-01.</p> <p>Air Conditioning Load: 35 Tons</p>			
<p>11. REQUIREMENT: 773 SM ADQT: XXX SM SUBSTD: 438 SM</p>			
<p><u>PROJECT:</u> Ground Based Strategic Deterrent (GBSD) Launch Center (LC)</p>			
<p><u>REQUIREMENT:</u> A GBSD Launch Center is required to support the First Flight starting 2QFY24. A new Launch Center is required at VAFB to support the GBSD flight test program. The LC is connected to the LFs and is where the Missile Combat Crew resides. The Missile Combat Crews issue the launch command from the LC to the LF. The Missile Combat Crew consists of contractor personnel and AFOTEC personnel for conducting the tests. The LC will support the entire Developmental Test (DT) and Initial Operational Testing and Evaluation (IOT&E) occurring in the GBSD EMD phase. The objective of the GBSD flight test program is to complete a minimum of 24 and up to 31 flight tests during the developmental and operational phases. The flight test program is conducted from Vandenberg AFB (VAFB) and utilizes the 30 SW Western Range (WR) as the Lead Range, and includes Reagan Test Site (RTS), Pacific Missile Range Facility (PMRF), and Naval Air Warfare Center Weapons Division, Point Magu (NAWCWPNS PM) as Support Ranges.</p>			
<p><u>CURRENT SITUATION:</u> The current ICBM system has 50+ year old Launch Center with above and below ground structures that service the Minuteman III system. The current ICBM LC will be demolished and a new LC with above and below ground structures will be constructed at the site to support the GBSD test program. A 2014 Analysis of Alternatives concluded full system recapitalization was most cost effective solution to address capability gaps.</p>			
<p><u>IMPACT IF NOT PROVIDED:</u> If design and construction of the LC is not complete by Dec 2023 then the 2QFY24 First Flight, will be delayed due to the necessary facility testing and approval to ensure it meets requirements and equipment fit out occurring between construction complete and First Flight. If testing was delayed by one (1) year then deployment would be impacted, increasing risk to maintaining the required total number of missiles on Alert during transition and deployment.</p>			
<p><u>ADDITIONAL:</u> This design shall conform to criteria established in the Air Force Corporate Facilities Standards (AFCFS), the Vandenberg AFB Installation Facilities Standard, but will not employ a standard facility design because there is no AF standard facility design for this project and there is no applicable standard design from Air Force Civil Engineer Center (AFCEC). This facility will be designed as permanent construction in accordance with the DoD Unified Facilities Criteria (UFC) 1-200-01, General Building requirements.</p> <p>An analysis of reasonable options for accomplishing this project indicated there is only one option that will meet operational requirements and weapon system specifications; new construction. A waiver to an Economic Analysis has been approved for this project.</p> <p>This project does not fall within the 100-year flood plain.</p> <p>This project was included in the Fiscal Year 21 future years' defense plan.</p> <p>Facility is sited in accordance with the Installation Development Plan and is within a compatible land use area.</p>			

AIR FORCE	FY 2021 MILITARY CONSTRUCTION PROJECT DATA		2. Date
3. INSTALLATION AND LOCATION VANDENBERG AFB, CALIFORNIA		4. PROJECT TITLE: GBSD LAUNCH CENTER	
5. PROGRAM ELEMENT 65230F	6. CATEGORY CODE 141175	7. PROJECT NUMBER 3376/XUMU21xxxxx	8. PROJECT COST (\$000) 23,000
30 th Space Wing Base Civil Engineer: 805-605-8591			
Category Code 141175 GUIDED MISSILE LAUNCH CENTER 773 SM= 8,319 SF; Demolition 438 SM = 4714 SF Mission requirements, operational considerations and location are incompatible with use by other components.			
12. Supplemental Data:			
a. Estimated Design Data:			
(1) Status:			
(a) Type of Design			Other
(b) Date Design Started			9 SEP 20
(c) Parametric Cost Estimates Used to develop Costs			YES
(d) Percent Complete as of 01JAN 2021			65%
(e) Date 35% Designed			30 NOV 20
(f) Date Design Complete			31 MAR 21
(g) Energy Study/Life-Cycle analysis was performed			NO
(2) Basis:			
(a) Standard or Definitive Design			NO
(b) Where Design was Most Recently Used			N/A
(3) Total Cost (c) = (a) + (b) or (d) + (e)			(\$000)
(a) Production of Plan and Specifications			###
(b) All other Design Costs			###
(c) Total			####
(d) Contract			###
(e) In-house			###
(4) Construction Contract Award			21JUN
(5) Construction Start			22 JAN
(6) Construction Complete			23 DEC
(7) Energy Study/Life-Cycle cost analysis was/will be performed			NO
(8) Parametric Cost Estimates used to develop costs			YES
		FISCAL YEAR	
EQUIPMENT NOMENCLATURE	PROCURING	APPROPRIATED OR	COST
	APPROPRIATION	REQUESTED	(\$000)

AIR FORCE		FY 2021 MILITARY CONSTRUCTION PROJECT DATA		2. Date	
3. INSTALLATION AND LOCATION VANDENBERG AFB, CALIFORNIA			4. PROJECT TITLE: GBSD LAUNCH CENTER		
5. PROGRAM ELEMENT 65230F		6. CATEGORY CODE 141175	7. PROJECT NUMBER 3376/XUMU21xxxxx		8. PROJECT COST (\$000) 23,000

ICD (705) Escorts, CST
 Communications & IT Equipment
 Furniture, Fixtures, & Equipment
 Weapon System Equipment
 Security Equipment

	3600	2022	12,700
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Vandenberg Air Force Base Vicinity Map – No Scale

Y1. COMPONENT AIR FORCE	FY 2021 MILITARY CONSTRUCTION PROJECT DATA			2. Date
3. INSTALLATION AND LOCATION VANDENBERG AFB, CALIFORNIA		4. PROJECT TITLE: GBSD LAUNCH FACILITIES ADDITIONS		
5. PROGRAM ELEMENT 65230F	6. CATEGORY CODE 149-512	7. PROJECT NUMBER 3376/XUMU22XXXXX	8. PROJECT COST (\$000) 18,300	
9. COST ESTIMATES				
Item	U/M	Quantity	Unit Cost	Cost (\$000)
PRIMARY FACILITIES				\$\$\$\$
ALTERATION MISSILE LAUNCH FACILITY (149-512) LF-26 repair project	EA	1	6,000	6,000
ALTERATION MISSILE LAUNCH FACILITY (149-512) LF-04 new construction project	EA	1	12,300	12,300
SUBTOTAL			-	
CONTINGENCY (5%)			-	
TOTAL CONTRACT COST			-	
SIOH (5.7%)			-	
DESIGN/BUILD-DESIGN COST (4%)				
TOTAL REQUEST				<hr/> 18,300
TOTAL REQUEST (ROUNDED)				(%)
APPROPRIATIONS (NON-ADD)				(%)
				<hr/> Xx,xxx
				18,300
				(000)
10. DESCRIPTION OF PROPOSED CONSTRUCTION:				
<p>Construct additions and modifications to Launch Facility-26 and Launch Facility-04 sites to convert from a Minuteman III (MMIII) configuration to a Ground Based Strategic Deterrent configuration for test launches starting in FY24. The project will include all relevant support facilities and lighted driving surfaces to replicate the operational GBSD launch facility sites. These facilities are located within a secure boundary and built to appropriate Anti-terrorism/force protection standards. Site improvements include clearing, grubbing, grading, demolition, as applicable, and storm drainage. Facilities will be designed as permanent construction in accordance with the Department of Defense Unified Facilities Criteria 1-200-01. This project will comply with Department of Defense antiterrorism/force protection requirements per Unified Facility Criteria 4-010-01. The project will demolish the launcher support building 56SM at LF-04. It does not have a facility number.</p> <p>Facilities are reinforced concrete and below grade to withstand harsh test environments during launch of the ICBM. The design and construction of the structures are heavily integrated into the weapon system components being designed by the Engineering and Manufacturing Development contract with Northrop Grumman.</p> <p>The project involves the repairs to LF-26 launch facility structures and the addition of a new launch support building and associated utilities. The project also includes the repairs to the launch facility structure at LF-04, the demolition of an existing launch support building and the construction of a new support building with associated utilities.</p>				

Y1. COMPONENT AIR FORCE	FY 2021 MILITARY CONSTRUCTION PROJECT DATA		2. Date
3. INSTALLATION AND LOCATION VANDENBERG AFB, CALIFORNIA		4. PROJECT TITLE: GBSD LAUNCH FACILITIES ADDITIONS	
5. PROGRAM ELEMENT 65230F	6. CATEGORY CODE 149-512	7. PROJECT NUMBER 3376/XUMU22XXXXX	8. PROJECT COST (\$000) 18,300
Air Conditioning Load: 0 Tons			
11. REQUIREMENT: 2 EA ADQT: 000 EA SUBSTD: 000 EA			
<p><u>PROJECT:</u> GBSD Launch Facilities Additions</p> <p><u>REQUIREMENT:</u> Air Force Global Strike Command (AFGSC) is a tenet of Vandenberg AFB (VAFB) and has the Intercontinental Ballistic Missile (ICBM) Test mission for the new GBSD program located at VAFB. Each of the two existing launch sites in this project will require some new construction, and some repairs to launch facilities to validate requirements of the facilities planned for the Operational Wings at F.E. Warren AFB, WY, Minot AFB, ND and Malmstrom AFB, MT. The fenced sites will consist of a launch silo, a telemetry support building, a launch support building at the below grade level and a paved driving surface.</p> <p><u>CURRENT SITUATION:</u> The Missile Launch Facility LF-26 was decommissioned in 2009 and has been in care-takers status since that time. Launch Facility -04 is currently being used for MMIII.</p> <p><u>IMPACT IF NOT PROVIDED:</u> The GBSD program must verify and validate all aspects of the design prior to the deployment of the ICBM. VAFB is the only location where both the infrastructure and the weapon system can be tested. During the Engineering and Manufacturing Development (EMD) phase of the program awarded in September of 2020, the contractor Northrop Grumman is required to demonstrate that the GBSD Infrastructure and Weapon System designs for the 450 Operational LFs meets all Weapon System Requirements. Deployment is scheduled for FY26 after Tests are conducted starting in FY24. Delays to the construction of the LFs will delay both test and deployment.</p> <p><u>ADDITIONAL:</u> This project meets applicable criteria/scope specified in Air Force Manual 32-1084, Facility Requirements. This design does not conform to criteria established in the Air Force Corporate Facilities Standards, the Installation Facility Standards, and will not employ a standard facility design because there is no AF standard facility design for this project and there is no applicable standard design from Air Force Civil Engineer Center. All reasonable alternatives were considered during the development of this project to include 1-new construction of a MMIII Launch Facility for conversion to GBSD, and 2-the construction of new support facilities and additions and repairs to the existing structures. The construction of facilities and additions to existing launch facilities is the only viable option to meet this requirement. A formal economic analysis waiver is in progress and will be completed before approval of the President's Budget. Sustainable principles, to include life-cycle cost-effective practices, will be integrated into the design, development, and construction of the project in accordance with Unified Facility Criteria 1-200-02. This includes preparation of a life-cycle cost analysis for energy consuming systems, renewable energy generating systems, whenever life-cycle cost effective is selected as the reason any</p>			

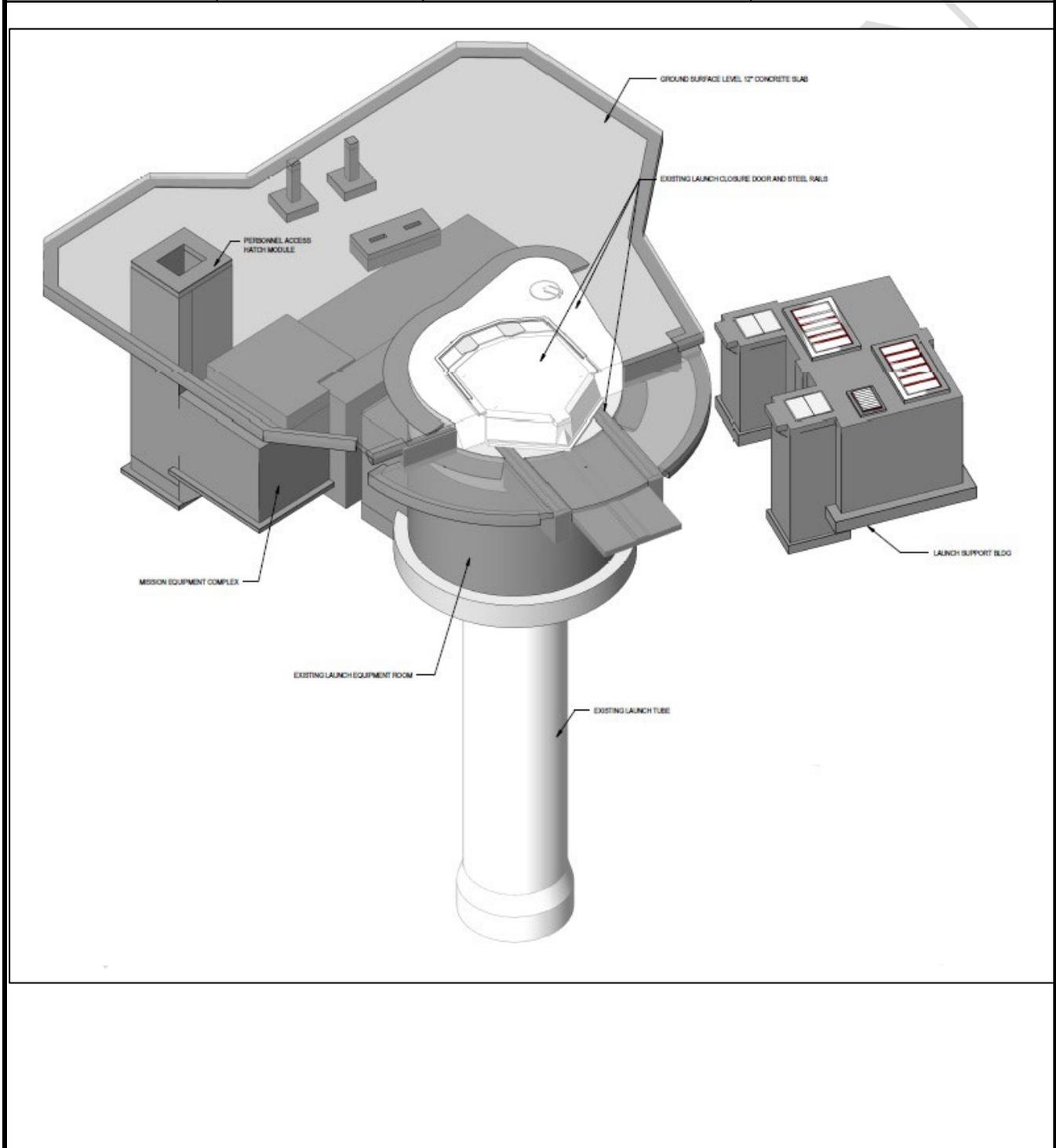
Y1. COMPONENT AIR FORCE	FY 2021 MILITARY CONSTRUCTION PROJECT DATA		2. Date
3. INSTALLATION AND LOCATION VANDENBERG AFB, CALIFORNIA		4. PROJECT TITLE: GBSD LAUNCH FACILITIES ADDITIONS	
5. PROGRAM ELEMENT 65230F	6. CATEGORY CODE 149-512	7. PROJECT NUMBER 3376/XUMU22XXXXX	8. PROJECT COST (\$000) 18,300
<p>requirement of the Unified Facility Criteria 1-200-02 is partially compliant or not applicable. Weapon System Specifications shall be considered in all requirements. This project does not fall within the 100-year flood plain. This project was included in the Fiscal Year 2021 future years' defense plan FY22-25. The Launch Facility is sited in accordance with the Installation Development Plan is within a compatible land use area.</p> <p>30th Space Force: Missile Launch Facility 2 EACH Tunnel 24 LF (12 LF EACH) Electric Power Station Building 186SM =2000SF (93 SM= 1000SF EACH) Demo Electric Power Station Building 56SM= 603SF Electric Power Station Building 140SM = 1506SF (70SM = 753SF EACH)</p> <p>JOINT USE CERTIFICATION: Mission Requirements, operational considerations, and location are incompatible with use of other components.</p>			
12. SUPPLEMENTAL DATA:			
a. Estimated Design Data:			
(1) Status:			
(a) Type of Design			OTHER
(b) Date Design Started			08SEP20
(c) Parametric Cost Estimate used to develop costs			YES
(d) Percent Complete as of 01 JAN21			35%
(e) Date 35% Designed			24NOV20
(f) Date Design Completed			22JUN21
(g) Energy Study/Life-Cycle Analysis was/will be performed			NO
Design and Construction of Infrastructure and Weapon System to be accomplished by GBSD Prime Contractor			
(2) Basis			
(a) Standard or Definitive Design			NO
(b) Where Design was Most Recently Used			N/A
(3) Total Cost = (c) =(a) +(b) or (d) + (e)			(\$)
(a) Production of Plans and Specs (6% limit)			\$
(b) All other Design Costs			\$
(c) All costs necessary to complete a 35% level of design			\$
(d) Contract			\$
(e) In-House Costs			\$ 0
(4) Construction Contract Award			21APR
(5) Construction Start			21JUN
(6) Construction Complete			23JAN

Y1. COMPONENT AIR FORCE	FY 2021 MILITARY CONSTRUCTION PROJECT DATA		2. Date
3. INSTALLATION AND LOCATION VANDENBERG AFB, CALIFORNIA		4. PROJECT TITLE: GBSD LAUNCH FACILITIES ADDITIONS	
5. PROGRAM ELEMENT 65230F	6. CATEGORY CODE 149-512	7. PROJECT NUMBER 3376/XUMU22XXXXX	8. PROJECT COST (\$000) 18,300

b. Equipment associated with this project provided from other appropriations:

EQUIPMENT NOMENCLATURE	PROCURING APPROPRIATION	FISCAL APPROPRIATED OR REQUESTED	COST (\$000)
Communications Equipment, Weapon System Installed Equipment Security Equipment	3600	2022	12,300
Facility Condition Index: (N/A for new mission)			

Y1. COMPONENT AIR FORCE	FY 2021 MILITARY CONSTRUCTION PROJECT DATA		2. Date
3. INSTALLATION AND LOCATION VANDENBERG AFB, CALIFORNIA		4. PROJECT TITLE: GBSD LAUNCH FACILITIES ADDITIONS	
5. PROGRAM ELEMENT 65230F	6. CATEGORY CODE 149-512	7. PROJECT NUMBER 3376/XUMU22XXXXX	8. PROJECT COST (\$000) 18,300



Y1. COMPONENT AIR FORCE	FY 2021 MILITARY CONSTRUCTION PROJECT DATA		2. Date
3. INSTALLATION AND LOCATION VANDENBERG AFB, CALIFORNIA		4. PROJECT TITLE: GBSD LAUNCH FACILITIES ADDITIONS	
5. PROGRAM ELEMENT 65230F	6. CATEGORY CODE 149-512	7. PROJECT NUMBER 3376/XUMU22XXXXX	8. PROJECT COST (\$000) 18,300



LF-26

LF-04

Point Sal Rd

Vandenberg AFB Vicinity Map – No Scale

Y1. COMPONENT AIR FORCE	FY 2021 MILITARY CONSTRUCTION PROJECT DATA		2. Date		
3. INSTALLATION AND LOCATION VANDENBERG AFB, CALIFORNIA		4. PROJECT TITLE: GBSD MISSILE BOOSTER STORAGE REPAIR			
5. PROGRAM ELEMENT 65230F	6. CATEGORY CODE 422-264	7. PROJECT NUMBER XUMU20-2201	8. PROJECT COST (\$000) 2,800		
9. COST ESTIMATES					
Item		U/M	Quantity	Unit Cost	Cost (\$000)
PRIMARY FACILITY					2,200
REPAIR MISSILE STORAGE FACILITY, (422-264)		EA	2	1,100	(2,200)
SUPPORTING FACILITIES					250
UTILITIES		LS			(100)
SITE IMPROVEMENTS		LS			(150)
SUBTOTAL					2,450
CONTINGENCY (5%)					123
TOTAL CONTRACT COST					2,573
SIOH (5.7%)					147
DESIGN/BUILD – DESIGN COST (4% of SUBTOTAL)					98
TOTAL REQUEST					2,817
TOTAL REQUEST (ROUNDED)					2,800
EQUIPMENT PROVIDED FROM OTHER APPROPRIATIONS (NON-ADD)					
10. DESCRIPTION OF PROPOSED CONSTRUCTION:					
<p>Convert two booster storage igloos (BLDGs 6811 & 6820) at Vandenberg AFB from MMIII to the Ground Based Strategic Deterrent (GBSD) configuration. Repairs include HVAC modifications/upgrades, sealing of structural cracks, surface painting, repairs to access doors, installation or upgrades to sensors, repair/replace rails, repair/replace winch, and repair access/driveway. Facility will be repaired in accordance with the Department of Defense Unified Facilities Criteria 1-200-01.</p> <p>The storage igloos have been used by MMIII for many years and will be converted to support developmental test activities beginning 2QFY23. The repair of the mission critical facilities are integral during the Engineering and Manufacturing Development (EMD) contract phase of the GBSD program.</p> <p>Air Conditioning Load: Storage Igloo – 15 tons</p>					
11. REQUIREMENT: SI-2 EA ADEQUATE: SI-0 EA SUBSTD: SI-2 EA					
PROJECT: GBSD MISSILE BOOSTER STORAGE REPAIR					
REQUIREMENT: Air Force Global Strike Command requires multiple storage igloos to support GBSD test operations at Vandenberg AFB beginning in 2QFY23.					
CURRENT SITUATION: The current storage igloos, BLDGs 6811 & 6820, have been in use with MMIII systems for 50+ years and cannot meet current GBSD requirements. Therefore, these will be converted to the GBSD configuration to meet developmental test activities at Vandenberg AFB.					

Y1. COMPONENT AIR FORCE	FY 2021 MILITARY CONSTRUCTION PROJECT DATA		2. Date																										
3. INSTALLATION AND LOCATION VANDENBERG AFB, CALIFORNIA		4. PROJECT TITLE: GBSD MISSILE BOOSTER STORAGE REPAIR																											
5. PROGRAM ELEMENT 65230F	6. CATEGORY CODE 422-264	7. PROJECT NUMBER XUMU20-2201	8. PROJECT COST (\$000) 2,800																										
<p>IMPACT IF NOT PROVIDED: The GBSD program must verify and validate all aspects of the design prior to the deployment of the ICBM. Vandenberg AFB is the only location where the weapon system can be tested. During the Engineering and Manufacturing Development (EMD) phase of the program awarded in September of 2020, the performance contractor is required to demonstrate that the GBSD Infrastructure and Weapon System designs meets all Weapon System Requirements. The critical path to developmental test start runs through Pathfinder Start (2QFY23) and First Flight (2QFY24), delays to the conversion of these storage igloos will cause a day-to-day delay to both DT and IOC.</p> <p>ADDITIONAL: This project meets applicable criteria/scope specified in Air Force Manual 32-1084, Facility Requirements. All reasonable alternatives were considered during the development of this project, new construction was not a cost effective solution. Repairing and converting the MMIII igloos is the only viable option to meet this requirement due to the cost prohibitive nature of building an entirely new storage igloo. Repairs will be in accordance with Unified Facility Criteria 1-200-02. Weapon System Specifications shall be considered in all requirements. This project does not fall within the 100-year flood plain.</p> <p>This project was not included in the Fiscal Year 2021 future years' defense plan FY22-25. The facilities in this project is existing so it is sited in accordance with the Installation Development Plan.</p> <p>30th Space Force; Storage Igloo 2 EA</p> <p>JOINT USE CERTIFICATION: Mission Requirements, operational considerations, and location are incompatible with use of other components.</p>																													
<p>12. SUPPLEMENTAL DATA:</p> <p>a. Estimated Design Data:</p> <p>(1) Status:</p> <table border="0"> <tr> <td>(a) Type of Design</td> <td>OTHER</td> </tr> <tr> <td>(b) Date Design Started</td> <td>15-OCT-20</td> </tr> <tr> <td>(c) Parametric Cost Estimate used to develop costs</td> <td>YES</td> </tr> <tr> <td>(d) Percent Complete as of 01 JAN21</td> <td>75%</td> </tr> <tr> <td>(e) Date 35% Designed</td> <td>03DEC21</td> </tr> <tr> <td>(f) Date Design Completed</td> <td>22MAR21</td> </tr> <tr> <td>(g) Energy Study/Life-Cycle Analysis was/will be performed</td> <td>NO</td> </tr> </table> <p>Design and Construction of Infrastructure and Weapon System to be accomplished by GBSD Prime Contractor</p> <p>(2) Basis</p> <table border="0"> <tr> <td>(a) Standard or Definitive Design</td> <td>NO</td> </tr> <tr> <td>(b) Where Design was Most Recently Used</td> <td>N/A</td> </tr> </table> <p>(3) Total Cost = (c) =(a) +(b) or (d) + (e)</p> <table border="0"> <tr> <td>(a) Production of Plans and Specs (6% limit)</td> <td>\$</td> </tr> <tr> <td>(b) All other Design Costs</td> <td>\$</td> </tr> <tr> <td>(c) All costs necessary to complete a 35% level of design</td> <td>\$</td> </tr> <tr> <td>(d) Contract</td> <td>\$</td> </tr> </table>				(a) Type of Design	OTHER	(b) Date Design Started	15-OCT-20	(c) Parametric Cost Estimate used to develop costs	YES	(d) Percent Complete as of 01 JAN21	75%	(e) Date 35% Designed	03DEC21	(f) Date Design Completed	22MAR21	(g) Energy Study/Life-Cycle Analysis was/will be performed	NO	(a) Standard or Definitive Design	NO	(b) Where Design was Most Recently Used	N/A	(a) Production of Plans and Specs (6% limit)	\$	(b) All other Design Costs	\$	(c) All costs necessary to complete a 35% level of design	\$	(d) Contract	\$
(a) Type of Design	OTHER																												
(b) Date Design Started	15-OCT-20																												
(c) Parametric Cost Estimate used to develop costs	YES																												
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(f) Date Design Completed	22MAR21																												
(g) Energy Study/Life-Cycle Analysis was/will be performed	NO																												
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(d) Contract	\$																												

Y1. COMPONENT AIR FORCE	FY 2021 MILITARY CONSTRUCTION PROJECT DATA		2. Date
3. INSTALLATION AND LOCATION VANDENBERG AFB, CALIFORNIA		4. PROJECT TITLE: GBSD MISSILE BOOSTER STORAGE REPAIR	
5. PROGRAM ELEMENT 65230F	6. CATEGORY CODE 422-264	7. PROJECT NUMBER XUMU20-2201	8. PROJECT COST (\$000) 2,800

(e) In-House Costs \$ 0
 (4) Construction Contract Award Currently on Contract
 (5) Construction Start 21-JUL
 (6) Construction Complete 22-SEP

b. Equipment associated with this project provided from other appropriations:

EQUIPMENT NOMENCLATURE	PROCURING APPROPRIATION	FISCAL APPROPRIATED OR REQUESTED	COST (\$000)
Communications Equipment, Weapon System Installed Equipment Security Equipment			

Facility Condition Index:

Current Storage Igloo Locations:



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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 0603260F / <i>Intelligence Advanced Development</i>
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COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
Total Program Element	-	5.672	4.312	5.795	0.000	5.795	-	-	-	-	-	-
64536A: <i>INTELLIGENCE EXPLOITATION TOOLS (IET)</i>	-	4.503	3.124	4.600	0.000	4.600	-	-	-	-	-	-
64537A: <i>INTELLIGENCE ANALYSIS CAPABILITIES (IAC)</i>	-	1.169	1.188	1.195	0.000	1.195	-	-	-	-	-	-

A. Mission Description and Budget Item Justification

Intelligence Advanced Development (IAD) develops and demonstrates technology required to support warfighter needs for timely all source intelligence information. IAD supports global awareness, consistent battlespace knowledge, precision information, and the execution of time critical missions. IAD focuses on enhancing defense intelligence capabilities through exploration and development of innovative tools including data analytics for mining and exploitation, machine-learning, and software automation. IAD projects provide improved on-time information to the warfighter using new and existing data sources, streamlining data analysis, thus reducing the footprint required, and enhancing performance. These support the Anti-Access/Area Denial (A2/AD) Contested/Congested Degraded Operations (CDO) problem set. The Air Force Research Lab, Rome Research Site, Information Intelligence Systems and Analysis Division (AFRL/RIE), works directly with users, employing evolutionary approaches and integrating finished modules directly into the field.

The programs are oriented toward specific shortfalls and deficiencies as documented by the Major Commands (MAJCOMs), Unified Commands, and intelligence organizations in their mission and functional area plans. This PE expedites technology transition from the laboratory to operational users via rapid prototyping. It is focused on technology insertion to correct AF intelligence deficiencies at the tactical and operational levels. The PE bridges the transition of new technologies from Advance Technology Demonstrations (ATDs) and Integrated Technology Thrust Programs (ITTPs) into current/new systems, and supports the associated Defense Technology Objectives (DTOs). IAD may also reallocate existing resources to support out-of-cycle new/updated warfighter requirements.

Requirements for this PE are identified and prioritized by Air Combat Command (ACC). Development of new/improved capabilities to meet the requirements are managed by AFRL/RIE. Prototype products, usually in the form of software, are provided to users in incremental capability spirals for operational environment evaluation. Additionally, IAD projects increasingly participate in on-going experimentation and prototype software development in support of the Advanced Battle Management Systems On-Ramp activities.

This program element may include necessary emergent or unanticipated civilian pay expenses required to manage, execute, and deliver IAD system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program element 0605831F. In FY20 0.430M was expended for civilian pay expenses in this program element, and in FY21 0.352M is forecasted for civilian pay expenses in this program element

This effort is in Budget Activity 4, Advanced Component Development and Prototypes (ACD&P), because efforts are necessary to evaluate integrated technologies, representative modes or prototype systems in a high fidelity and realistic operating environment.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force	Date: May 2021
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Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 0603260F / <i>Intelligence Advanced Development</i>
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B. Program Change Summary (\$ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Previous President's Budget	5.672	4.320	5.882	0.000	5.882
Current President's Budget	5.672	4.312	5.795	0.000	5.795
Total Adjustments	0.000	-0.008	-0.087	0.000	-0.087
• Congressional General Reductions	0.000	-0.008			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	0.000	0.000			
• Other Adjustments	0.000	0.000	-0.087	0.000	-0.087

Change Summary Explanation

FY21: \$0.008 Congressional reduction from equal distribution cut across all AF RDT&E programs.

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force										Date: May 2021		
Appropriation/Budget Activity 3600 / 4					R-1 Program Element (Number/Name) PE 0603260F / <i>Intelligence Advanced Development</i>				Project (Number/Name) 64536A / <i>INTELLIGENCE EXPLOITATION TOOLS (IET)</i>			
COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
64536A: <i>INTELLIGENCE EXPLOITATION TOOLS (IET)</i>	-	4.503	3.124	4.600	0.000	4.600	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The mission is to develop prototypes which encompass several areas of intelligence exploitation including the advancement of all source correlation and fusion for the intelligence analyst. Projects include development of innovative data analytics, machine-learning, and automated software tools. The intent is to enhance the overall situational awareness for Air Force, DoD, and Coalition groups which have requirements to correlate various sources of intelligence information, including Communications Intelligence (COMINT), Electronics Intelligence (ELINT), Imagery Intelligence (IMINT), Geospatial Intelligence (GEOINT), Measurement and Signature Intelligence (MASINT), Signals Intelligence (SIGINT), Publicly Available Information (PAI) and others, in a timely manner. IET may reallocate existing resources to support out-of-cycle new/updated warfighter requirements.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver IAD system capability. The use of such programs funds would be in addition to the civilian pay expenses budgeted in program element 0605831F. In FY20 0.000M was expended for civilian pay expenses in this program element, and in FY21 0.000M is forecasted for civilian pay expenses in this program element

B. Accomplishments/Planned Programs (\$ in Millions)

	FY 2020	FY 2021	FY 2022
Title: Intelligence Exploitation Tools (IET)	4.503	3.124	4.600
Description: IET addresses the accurate and timely interpretation of various Intelligence data sources (such as digital imagery, video, documents, signals) by developing and evaluating methods to index, exploit, and manipulate disparate data products using analytics, machine-learning, and software automation. This provides the analyst with the ability to rapidly search and fuse multiple intelligence sources for improved situational awareness and to better detect anomalies. Cross domain tools enable data exploitation at multiple classification levels. In addition, methods to improve analysis of current and future foreign weapon systems are developed. IET provides enhanced warning and accuracy to allow national and military authorities a greater range of options to avert, diminish or control a crisis.			
FY 2021 Plans:			
- Completed development and integration of space based modeling capabilities into the Integrated Many on Many (IMOM) mission planning tool			
- Continued implementation of operational metadata capability for DCGS SIGINT collection systems			

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force		Date: May 2021		
Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0603260F / <i>Intelligence Advanced Development</i>	Project (Number/Name) 64536A / <i>INTELLIGENCE EXPLOITATION TOOLS (IET)</i>		
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2020	FY 2021	FY 2022
<ul style="list-style-type: none"> - Continued development for Mobile Command, Control, Communication, and Computer (Mobile C4) database and visualization capability for intelligence operators; integrated into National Air and Space Intelligence Center (NASIC) toolset - Continued development activities for automated artificial intelligent systems and modeling and simulation tools for understanding and visualizing patterns of life, for detecting vulnerabilities in weapon systems, and for the analysis of targets from multi-INT data in various threat environments - Developing multi-INT entity resolution capabilities, utilizing cataloged repositories, which will enable analysts to apply automated machine intelligence and prediction tools to identify trends and mission statistics for SIGINT and DCGS users - Added automation to a live PED tasking order workflow by ingesting mission data, flying schedules, & authorized service interruptions, enabling user-defined rolls that allow mission change requests & verification of mission changes to occur between C2 node & PED sites prior to final publication & sharing with the larger community - Conducted user evaluations and prototype releases <p>FY 2022 Plans:</p> <ul style="list-style-type: none"> - Will develop multi-INT entity resolution capabilities, utilizing cataloged repositories, which will enable analysts to apply automated machine intelligence and prediction tools to identify trends and mission statistics for SIGINT and DCGS users - Will develop tools to enhance, automate, correlate, & fuse multi-source, multi-domain ISR data for NASIC situational awareness & threat assessment - Will develop prototypes to improve effects & operations across the ISR battlespace via cyber response capability in support of DCGS cyber defense response initiatives - Will develop a scalable FMV Cloud Pilot capability in support of DCGS, enabling cloud based integration of AI/ML algorithms - Will develop streamlined Battle Damage Assessment process via automation and implement cross-domain solutions to collate intel data for physical and functional damage assessments for analyst review toolkits <p>FY 2021 to FY 2022 Increase/Decrease Statement: Funding increased due to support for final prototype user evaluations</p>				
Accomplishments/Planned Programs Subtotals		4.503	3.124	4.600

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0603260F / <i>Intelligence Advanced Development</i>	Project (Number/Name) 64536A / <i>INTELLIGENCE EXPLOITATION TOOLS (IET)</i>

C. Other Program Funding Summary (\$ in Millions)
N/A

Remarks

D. Acquisition Strategy

Requirements for new/improved techniques for operational employment of simulation models are identified and prioritized by ACC. Development of the new/improved capabilities to meet these requirements is managed by Air Force Research Laboratory (AFRL) Rome Research Site. Prototype products (usually software), once evaluated by the users, are transitioned from the laboratory to the operational community in spirals. All major contracts within this project are awarded after full and open competition.

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Exhibit R-4A, RDT&E Schedule Details: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0603260F / <i>Intelligence Advanced Development</i>	Project (Number/Name) 64536A / <i>INTELLIGENCE EXPLOITATION TOOLS (IET)</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>IET</i>				
IET Development	1	2020	4	2022
Software to improve support to intelligence analysts through cognitive systems	1	2020	4	2022
DCGS enterprise support to cyber response	3	2021	3	2022
DCGS FMV Cloud Pilot	3	2021	4	2022
Modernize BDA analysis prototype	1	2022	4	2022
Operational metadata capability for DCGS SIGINT collection systems	1	2020	4	2020
Multi-domain ISR support to NASIC	1	2022	4	2022
FY20 IET User Evaluations & Prototype Releases	1	2020	4	2020
FY21 IET User Evaluations & Prototype Releases	1	2021	4	2021
FY22 IET User Evaluations & Prototype Releases	1	2022	4	2022

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force										Date: May 2021		
Appropriation/Budget Activity 3600 / 4					R-1 Program Element (Number/Name) PE 0603260F / <i>Intelligence Advanced Development</i>				Project (Number/Name) 64537A / <i>INTELLIGENCE ANALYSIS CAPABILITIES (IAC)</i>			
COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
64537A: <i>INTELLIGENCE ANALYSIS CAPABILITIES (IAC)</i>	-	1.169	1.188	1.195	0.000	1.195	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The mission is to provide continuing development and upgrades of threat analysis capabilities to produce integrated, predictive air and space intelligence to enable military operations, force modernization decisions, and policy making. Products from IAC allow the Intelligence Analyst to accelerate and increase the accuracy of threat estimates and system descriptions to deployed operational forces. Each of the development projects within the IAC program portfolio transition technologies to the operational communities through the incremental release of upgraded versions over a period of years as development projects progress towards the final configuration. IAC may reallocate existing resources to support out-of-cycle new/ updated warfighter requirements.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver IAD system capability. The use of such programs funds would be in addition to the civilian pay expenses budgeted in program element 0605831F. In FY20 0.430M was expended for civilian pay expenses in this program element, and in FY21 0.352M is forecasted for civilian pay expenses in this program element

B. Accomplishments/Planned Programs (\$ in Millions)

	FY 2020	FY 2021	FY 2022
Title: Intelligence Analysis Capabilities (IAC) Development	1.169	1.188	1.195
Description: IAC develops tools and algorithms for Intelligence Analysts with the ability to produce accurate, predictive, relevant, and timely intelligence that supports client processes, operational planning, and mission execution. Methods include data analytics techniques, machine-learning, and software automation. IAC develops new and upgraded analysis, modeling and simulation tools focused on intelligence production supporting AF operational and developmental all source analysis functions.			
FY 2021 Plans:			
- Continued development of a query class prototype system that will enable users to search large volumes of disparate multimodal and multilingual data sources; this service will be accessible for use by DoD and Intelligence Community (IC) cloud service architectures			
- Continued development of a prototype Modeling and Simulation tool to address the need for improved threat Integrated Air Defense (IADS) passive detection/tracking and combat identification			
- Continued development Mobile Command, Control, Communication, and Computer (Mobile C4) database and visualization capability for intelligence operators; integrated into National Air and Space Intelligence Center (NASIC) toolset			

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force		Date: May 2021		
Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0603260F / <i>Intelligence Advanced Development</i>	Project (Number/Name) 64537A / <i>INTELLIGENCE ANALYSIS CAPABILITIES (IAC)</i>		
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2020	FY 2021	FY 2022
<ul style="list-style-type: none"> - Continued development of a prototype for providing improved Electronic Warfare (EW) information to operational users by leveraging the capabilities of the modernized, national EW databases; this will include signal identification, waveform ambiguity detection and emitter descriptions across all three national EW databases - Continued development of a machine learning (ML) collaboration & deployment framework for AF DCGS; provide intelligence ops with an intuitive environment that simplifies deployment/sharing of ML algorithms/models & operational intelligence datasets - Supporting user evaluations and prototype releases <p>FY 2022 Plans:</p> <ul style="list-style-type: none"> - Will develop prototype for collaborative environment to connect intelligence requirements with exploitation teams to increase the level of information available to analysts to improve tactical level intelligence production and reporting - Will develop prototype for computational data handling tools to ingest disparate data types across multiple disciplines within Air and Space Operations Centers to disseminate and display to decision makers through existing Common Operational Pictures and Dashboards - Will complete development of a query class prototype system that will enable users to search large volumes of disparate multimodal and multilingual data sources; accessible for use by DoD and IC cloud service architectures - Will continue Mobile Command, Control, Communication, and Computer (Mobile C4) database and visualization capability for intelligence operators; integrated into National Air and Space Intelligence Center (NASIC) toolset - Will complete development of a machine learning (ML) collaboration & deployment framework for AF DCGS; provide intel ops with an intuitive environment that simplifies deployment/sharing of ML algorithms/ models & operational intel datasets <p>FY 2021 to FY 2022 Increase/Decrease Statement: Funding increased due to additional efforts working with Advanced Battle Management System (ABMS) product line development for AI and ML interfaces</p>				
Accomplishments/Planned Programs Subtotals		1.169	1.188	1.195
C. Other Program Funding Summary (\$ in Millions)				
N/A				

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0603260F / Intelligence Advanced Development	Project (Number/Name) 64537A / INTELLIGENCE ANALYSIS CAPABILITIES (IAC)

C. Other Program Funding Summary (\$ in Millions)

Remarks

D. Acquisition Strategy

Requirements of new/upgraded intelligence analysis tools are identified and prioritized by the ACC. Development of capabilities to meet these requirements is managed by AFRL Rome Research Site. Prototype products (usually software), once evaluated by the users, are fielded in incremental capability spirals. All major contracts within this project are awarded after full and open competition.

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Exhibit R-4, RDT&E Schedule Profile: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0603260F / <i>Intelligence Advanced Development</i>	Project (Number/Name) 64537A / <i>INTELLIGENCE ANALYSIS CAPABILITIES (IAC)</i>

FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

IAC	
IAC Development	
Query class system to search large volumes of multimodal / multilingual sources	
Modeling and Simulation for improved IADS passive detection/tracking and combat ID	
Mobile C4 database and visualization for intelligence operators	
Framework for DCGS sharing machine learning algorithms/models & operational intelligence datasets	
Prototype computational data handling toolsets	
Prototype Collaborative Environment for Multi-Domain data ingest and display	
FY20 IAC User Evaluations & Prototype Releases	
FY21 IAC User Evaluations & Prototype Releases	
FY22 IAC User Evaluations & Prototype Releases	

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Exhibit R-4A, RDT&E Schedule Details: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0603260F / <i>Intelligence Advanced Development</i>	Project (Number/Name) 64537A / <i>INTELLIGENCE ANALYSIS CAPABILITIES (IAC)</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
IAC				
IAC Development	1	2020	4	2022
Query class system to search large volumes of multimodal / multilingual sources	1	2020	4	2022
Modeling and Simulation for improved IADS passive detection/tracking and combat ID	1	2020	4	2022
Mobile C4 database and visualization for intelligence operators	1	2020	4	2021
Framework for DCGS sharing machine learning algorithms/models & operational intelligence datasets	2	2020	4	2022
Prototype computational data handling toolsets	4	2021	4	2022
Prototype Collaborative Environment for Multi-Domain data ingest and display	4	2021	4	2022
FY20 IAC User Evaluations & Prototype Releases	1	2020	4	2020
FY21 IAC User Evaluations & Prototype Releases	1	2021	4	2021
FY22 IAC User Evaluations & Prototype Releases	1	2022	4	2022

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 0603742F I <i>Combat Identification Technology</i>
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COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
Total Program Element	-	31.367	26.348	21.939	0.000	21.939	-	-	-	-	-	-
642597: <i>Noncooperative Identification Subsystems</i>	-	24.010	22.076	19.283	0.000	19.283	-	-	-	-	-	-
642599: <i>Cooperative Identification Techniques</i>	-	2.040	2.076	0.000	0.000	0.000	-	-	-	-	-	-
643420: <i>Combat ID Database Development</i>	-	5.317	2.196	2.656	0.000	2.656	-	-	-	-	-	-

A. Mission Description and Budget Item Justification

Combat Identification is the process of determining the identity of an entity in the battlespace. It is essential to determine if that entity is a friend, neutral or enemy; and if an enemy, the nature of the entity determines how it should be engaged. The Combat Identification team's mission is to identify new and promising technology candidates, evaluate the usefulness of the technologies, conduct demonstrations in operationally relevant environments, and coordinate strategies that expedite transition to more than one platform. This Program Element aims to integrate and transition new capabilities into fielded systems, and improve existing capabilities. The mission area consists of three projects: non-cooperative Combat Identification, cooperative Combat Identification, and Combat Identification database development. Non-cooperative Combat Identification techniques do not depend on a response from the targeted platform - such as high range resolution radar that measures the length of a target. Cooperative Combat Identification systems require communication between two participating platforms. Combat Identification database development matures techniques to ensure target representations in the database enable the algorithms to perform correctly. Both non-cooperative and cooperative Combat Identification techniques are currently in the field, and are necessary elements of the kill chain that ensure mission success and reduce fratricide.

Activities also include studies and analysis to support both current program planning and execution and future program planning.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver Combat Identification technologies. The use of such program funds would be in addition to the civilian pay expenses budgeted in program element 0605831F.

This effort is in Budget Activity 4, Advanced Component Development and Prototypes (ACD&P), because efforts are necessary to evaluate integrated technologies, representative modes or prototype systems in a high fidelity and realistic operating environment.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 0603742F / <i>Combat Identification Technology</i>
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B. Program Change Summary (\$ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Previous President's Budget	32.085	26.396	24.797	0.000	24.797
Current President's Budget	31.367	26.348	21.939	0.000	21.939
Total Adjustments	-0.718	-0.048	-2.858	0.000	-2.858
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	0.000	0.000			
• Other Adjustments	-0.718	-0.048	-2.858	0.000	-2.858

Congressional Add Details (\$ in Millions, and Includes General Reductions)

Project: 643420: *Combat ID Database Development*

Congressional Add: *Trusted Time Loaders*

	FY 2020	FY 2021
	4.417	0.000
Congressional Add Subtotals for Project: 643420	4.417	0.000
Congressional Add Totals for all Projects	4.417	0.000

Change Summary Explanation

This funding will enable the Combat Identification portfolio to continue developing critical Combat Identification technologies.

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force										Date: May 2021		
Appropriation/Budget Activity 3600 / 4					R-1 Program Element (Number/Name) PE 0603742F / <i>Combat Identification Technology</i>				Project (Number/Name) 642597 / <i>Noncooperative Identification Subsystems</i>			
COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
642597: <i>Noncooperative Identification Subsystems</i>	-	24.010	22.076	19.283	0.000	19.283	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Non-cooperative combat identification employs a number of sensing technologies and signal processing techniques designed to extract discriminating features from a battlespace entity (target). Specifically-designed algorithms compare those extracted features to a tailored database to identify those targets. These technologies include: (A) Air-to-Air non-cooperative technologies, (B) Air to Ground non-cooperative technologies, and (C) Studies and Analysis, evaluating potential new technologies. Air-to-Air technologies include implementations of the Joint Multi-platform Advanced Combat identification architecture, which is a framework that allows multiple sensors to provide a robust combat identification solution; and an effort aimed at the discovery and generation of features. Air-to-Air efforts are (1) Hydravision, which is currently implementing and demonstrating the architecture in an F-16 testbed aircraft; and (2) Integrated Combat identification and Electronic warfare (ICE), which incorporates features extracted from an electronic warfare suite to enhance the F-16 solution. Air-to-Ground technologies consist of (3) Compact Aided target recognition and Sustainable Environments (CASE), an approach that focuses on tailoring algorithms to use small, efficient databases that are relatively inexpensive to generate and maintain; (4) Passive Radio frequency IDentification Environment (PRIDE), an effort to develop a capability useful in a denied access environment using passive radar and electronic warfare information; (5) Radio IDentification (RID), an effort to develop methods (including machine learning and artificial intelligence algorithms) paired with advances in software defined radios to provide enhanced solutions, improve aircrew situational awareness and assist in fratricide prevention with military and civil air platforms - potentially fusing non-cooperative and cooperative technologies; and (6) Kill-chain Weapon Integrated CID (KWIC), an effort that will use information from launched weapons through a back channel communication link to provide combat identification from within the hot battlespace. Studies and Analysis will continue to discover novel technologies that are ready to become a transitionable project, and includes (7) Enhanced Combat ID (ECID), an activity to develop a robust ability to quantitatively evaluate promising technologies using enhanced modeling and simulation capabilities. The Studies and Analysis effort will also perform early assessments of promising technologies to determine if the program should incorporate them as a formal project within the non-cooperative portfolio.

In FY 2022 our non-cooperative Air to Air goals will be to follow on to the FY 2021 transition of the Joint Multi-platform Advanced Combat Identification architecture into the F-16 System Integration Laboratory and initial flight test. The follow-on activity will consist of an extensive demonstration of the capability during a flight test series, confirming the performance improvements effected by Joint Multi-platform Advanced Combat Identification. The Integrated Combat Identification and Electronic Warfare project will move into the F-16 System Integration Laboratory in FY 2022, enabling an initial flight test in FY 2023. For non-cooperative Air-to-Ground projects, Compact Aided Target Recognition and Sustainable Environments will come to a close at the end of FY 2022 after a successful demonstration and transition to the F-15E. The Passive Radio Frequency Identification Environment effort will largely complete the second of three phases in FY 2022, paving the way for the third phase which will provide a Technology Readiness Level 6 insertion into an operational platform - the third phase will be paid for by that platform. Radio Identification will also largely complete its second phase in FY 2022, enabling the System Program Office funded demonstration on a surrogate platform in FY 2023. Kill-chain Weapon Integrated Combat Identification will enter its second full year in FY 2022, the team will have had an opportunity to analyze data collected in mid-FY 2021 and craft a plan to tailor algorithms and existing synthetic databases to accommodate the unique requirements of the transition platform; FY 2022 will see the team executing that plan. Per Senior Advisory Group direction, Laser Vision activities will be put into a hibernation state starting in FY 2022; Vibrometry Advanced Mode Processor and 3-dimensional

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force	Date: May 2021
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Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0603742F / <i>Combat Identification Technology</i>	Project (Number/Name) 642597 / <i>Noncooperative Identification Subsystems</i>
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laser imaging will both be complete as scheduled and ready to transition Combat Identification capability to Litening in FY 2021, and the multi-mode ladar effort no longer has a targeted transition platform.

Activities also include studies and analysis to support both current program planning and execution and future program planning.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver Combat Identification technologies. The use of such program funds would be in addition to the civilian pay expenses budgeted in program elements 0605826F, 0605827F, 0605828F, 0605829F, 0605830F, 0605831F, 0605832F, and 0605898F.

B. Accomplishments/Planned Programs (\$ in Millions)

	FY 2020	FY 2021	FY 2022
<p>Title: Laser Vision</p> <p>Description: The Vibrometry Advanced Mode Processor effort develops advanced algorithms for processing data provided by laser vibrometry sensors to demonstrate prototype pilot Aided Target Recognition software. This leverage ability of active electro-optic sensors to sense micro-displacements of operating machinery to measure the resulting frequency spectrum. The effort will assess utility for air-to-ground Combat Identification and will apply Aided Target algorithms to determine how well the technology can separate target classes.</p> <p>Laser Vision is part of a family of electro-optical systems that significantly increase Identification ranges. It provides the demonstration and evaluation data necessary to support decisions on future electro optical technologies supporting Combat Identification, including 3-dimensional imaging laser radar (Ladar) and exploration of advanced concepts. The 3-dimensional laser imaging technology provides a display of a 3-dimensional image to the pilot for high confidence combat identification and is a potential for the next generation targeting pods for the Department of the Air Force.</p> <p>The Multi-Mode Ladar Aided Target Recognition, which combines the work of 3-dimensional laser imaging and Sensor for Image Recognition and Exploitation / Vibrometry Advanced Mode Processor (laser vibrometry), to create a longer-range fused-feature Combat Identification technique that uses the combined orthogonal features of both systems to provide a robust long-range Combat Identification capability.</p> <p>FY 2021 Plans: Will integrate Multi-Mode Ladar Aided, 3-dimensional laser imaging, and Vibrometry Advanced Mode Processor work into new, more capable package.</p> <p>FY 2022 Plans: Effort will be completed in FY 2021, thus no additional funding is required.</p> <p>FY 2021 to FY 2022 Increase/Decrease Statement:</p>	3.920	3.100	0.000

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force		Date: May 2021		
Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0603742F / <i>Combat Identification Technology</i>	Project (Number/Name) 642597 / <i>Noncooperative Identification Subsystems</i>		
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2020	FY 2021	FY 2022
FY 2022 decreased compared to FY 2021 by \$3.100 million. Funding decreased due to effort scheduled to be completed in FY 2021.				
<p>Title: Hydra Vision/Air to Air</p> <p>Description: Hydra Vision Multi-Sensor Enhanced Identification is a balanced (robust) amalgamation of sensor data from multiple sources to provide warfighters with higher confidence Combat Identification results on surface or air targets. This effort focuses on Air-to-Air and Air-to-Ground.</p> <p>FY 2021 Plans: Will further development of feature level fusion that will be integrated into a tactical platform's mission computer.</p> <p>FY 2022 Plans: This effort will be implementing and demonstrating Joint Multi-sensor Advanced Combat Identification in an F-16 testbed aircraft and Integrated Combat Identification with Electronic Warfare.</p> <p>FY 2021 to FY 2022 Increase/Decrease Statement: FY 2022 decreased compared to FY 2021 by \$0.835 million. Justification for this decrease is described in plans above.</p>		5.100	4.778	3.943
<p>Title: Compact Aided Target Recognition and Sustainable Environment (CASE)</p> <p>Description: Compact Aided Target Recognition and Sustainable Environment is a family of efforts to address efficiency and sustainability issues associated with the development, operation and maintenance of non-cooperative Aided Target Recognition technology. Develop sustainable multi-phenomenology Aided Target Recognition based on low fidelity, compact, and inexpensive database technology.</p> <p>FY 2021 Plans: This effort will transition Synthetic Aperture Radar Automatic Target Recognition capability to National Air and Space Intelligence Center in FY 2021; nearing completion.</p> <p>FY 2022 Plans: This effort will investigate the viability of using machine learning algorithms to continue to provide Combat Identification ranges for ground targets, but less is needed. Conduct verification/validation and analysis of data collected during FY 2021.</p> <p>FY 2021 to FY 2022 Increase/Decrease Statement: FY 2022 increased compared to FY 2021 by \$0.250 million. Justification for this increase is described in plans above.</p>		2.666	0.700	0.950
<p>Title: Passive Radio Frequency Identification Environment (PRIDE)</p>		4.888	4.281	4.123

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0603742F / <i>Combat Identification Technology</i>	Project (Number/Name) 642597 / <i>Noncooperative Identification Subsystems</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2020	FY 2021	FY 2022
<p>Description: Develop passive Radio Frequency target Identification capability for denied access environment utilizing passive Radio Frequency and Electronic Warfare information with potential non-traditional Intelligence, Surveillance and Reconnaissance capabilities.</p> <p>FY 2021 Plans: Will continue expansion of higher-offset-angle synthetic aperture radar bistatic mode.</p> <p>FY 2022 Plans: This effort will develop an Identification capability useful in a denied access environment using passive Radio Frequency and Electronic Warfare (EW) information. Efforts require less for data collection activities in FY 2022.</p> <p>FY 2021 to FY 2022 Increase/Decrease Statement: FY 2022 decreased compared to FY 2021 by \$0.158 million. Justification for this decrease is described in plans above.</p>			
<p>Title: Radio ID (RID)</p> <p>Description: Radio Identification will develop technologies to integrate radio based cooperative technologies with non-cooperative technologies into the cockpit. The benefits will be increased confidence target identification and situational awareness as well as reduced fratricides.</p> <p>FY 2021 Plans: Will execute the first airborne demonstration of the technology.</p> <p>FY 2022 Plans: This effort will develop methods for using advances in software defined radios to provide enhanced Combat Identification solutions and improve aircrew situational awareness. Initial development will give way to a lab demonstration with smaller funding requirements.</p> <p>FY 2021 to FY 2022 Increase/Decrease Statement: FY 2022 decreased compared to FY 2021 by \$0.919 million. Justification for this decrease is described in plans above.</p>	3.058	3.919	3.000
<p>Title: Studies</p> <p>Description: Conduct Combat Identification related studies/demos.</p> <p>FY 2021 Plans:</p>	4.378	4.281	4.267

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force		Date: May 2021		
Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0603742F / <i>Combat Identification Technology</i>	Project (Number/Name) 642597 / <i>Noncooperative Identification Subsystems</i>		
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2020	FY 2021	FY 2022
<p>Will shake out advanced concepts to determine if they will become development projects. These include integration of electronic warfare features as a Combat Identification source; upgrades to synthetic aperture radar combat identification; extraction of features from sensors on flyout weapons; and a variety of modeling and simulation efforts.</p> <p>FY 2022 Plans: In FY 2022 efforts will continue modeling, simulation and analysis of Combat Identification technologies and also new Concept Call technology development.</p> <p>FY 2021 to FY 2022 Increase/Decrease Statement: FY 2022 decreased compared to FY 2021 by \$0.014 million. Justification for this decrease is described in plans above.</p>				
<p>Title: Kill-chain Weapon Integrated CID (KWIC)</p> <p>Description: Kill-chain Weapons Integrated Combat Identification will use air to ground sensors to provide better situational awareness and Combat Identification of target area</p> <p>FY 2021 Plans: Collect information from launched weapons through a back link to provide Combat Identification for the hot battlespace. Develop novel Combat Identification technologies that are ready to turn into a transitional Non-Cooperative Combat Identification effort.</p> <p>FY 2022 Plans: Continue with feature extraction and algorithm development.</p> <p>FY 2021 to FY 2022 Increase/Decrease Statement: FY 2022 increased compared to FY 2021 by \$1.983 million. Funding increased due to increased interest from transition partner to accelerate schedule. Partner has provided additional funding and a timeline for development and Combat Identification funding has been allocated to meet this timeline.</p>		0.000	1.017	3.000
Accomplishments/Planned Programs Subtotals		24.010	22.076	19.283
C. Other Program Funding Summary (\$ in Millions)				
N/A				
Remarks				
D. Acquisition Strategy				
<p>Combat Identification develops technologies for exploitation by the United States Air Force and other services. Award multiple, competitive contract vehicles emphasizing off-the-shelf technology and maximizing the use of non-developmental items (NDIs). Management develops a technology to a point it can be demonstrated in a relative combat environment.</p>				

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0603742F / <i>Combat Identification Technology</i>	Project (Number/Name) 642597 / <i>Noncooperative Identification Subsystems</i>
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Product Development (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Hydra Vision (Air-to-Air) - L	C/CPFF	Leidos : Dayton, OH	-	0.246	Feb 2020	1.000	Jan 2021	0.603	Jan 2022	-		0.603	-	-	-
Air Target ID (Air-to-Air)	C/CPAF	TBD : TBD	-	-		-		1.370	Feb 2022	-		1.370	-	-	-
Target Recognition & Tracking Technology	MIPR	Sandia : Albuquerque, NM	-	0.900	Feb 2020	0.600	Feb 2021	0.400	Oct 2021	-		0.400	-	-	-
CASE - Compact AiTR and Sustainable Environment Analysis - L	C/CPFF	Leidos : Dayton, OH	-	1.066	Jan 2020	1.295	Jan 2021	0.500	Jan 2022	-		0.500	-	-	-
Passive Radar Identification Environment (PRIDE) - L	C/CPFF	Leidos : Mclean, VA	-	3.631	Feb 2020	3.000	Oct 2020	2.700	Oct 2021	-		2.700	-	-	-
Radio Identification (RID) L	MIPR	DMEA : Sacramento, CA	-	1.000	Feb 2020	2.000	Feb 2021	2.100	Feb 2022	-		2.100	-	-	-
Radio Identification (RID) NG	MIPR	DMEA : Sacramento, OH	-	0.678	Jul 2020	1.919	Mar 2021	0.900	Feb 2022	-		0.900	-	-	-
M2LATR	C/CPFF	TBD : TBD	-	0.455	Mar 2020	1.430	Mar 2021	0.581	Apr 2022	-		0.581	-	-	-
M2LATR MIT Lincoln Lab	MIPR	MIT Lincoln Lab : Boston, MA	-	0.786	Sep 2020	0.000		0.000		-		0.000	-	-	-
VAMP	C/CPAF	Northrop Grumman : Rolling Meadows, IL	-	1.250	Feb 2020	0.350	Jan 2021	0.000		-		0.000	-	-	-
3DTO	C/CPAF	DEC : Beavercreek, OH	-	0.600	Mar 2020	0.000	Mar 2021	0.000		-		0.000	-	-	-
Infoscitex	C/CPAF	Infoscitex : Dayton, OH	-	0.380	Mar 2020	0.000	Mar 2021	0.130	Mar 2022	-		0.130	-	-	-
PRECISE-N	C/CPAF	Northrop Grumman : Baltimore, MD	-	3.200	Jan 2020	1.700	Jan 2021	1.015	Dec 2021	-		1.015	-	-	-
PRECISE-R	C/CPAF	Raytheon : El Segundo, CA	-	3.050	Jan 2020	1.691	Jan 2021	0.981	Dec 2021	-		0.981	-	-	-
PRECISE-M	C/CPAF	Matrix : Beavercreek, OH	-	0.891	Jun 2020	0.980	Mar 2021	0.750	Jan 2022	-		0.750	-	-	-
CAST	MIPR	DMEA : Sacramento, CA	-	1.436	Jan 2020	0.300	Jan 2021	0.200	Jan 2022	-		0.200	-	-	-
Concept Call #1	C/CPAF	TBD : TBD	-	-		0.400	May 2021	0.200	May 2022	-		0.200	-	-	-

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0603742F / <i>Combat Identification Technology</i>	Project (Number/Name) 642597 / <i>Noncooperative Identification Subsystems</i>
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Product Development (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Concept Call #2	C/CPAF	TBD : TBD	-	-		0.250	May 2021	0.450	May 2022	-		0.450	-	-	-
Concept Call #3	C/CPAF	Not specified. : TBD	-	-		0.100	May 2021	0.100	May 2022	-		0.100	-	-	-
Integrated CID and EW GTRI	C/CPAF	GTRI : Dayton, OH	-	0.400	Dec 2019	0.400	Jan 2021	0.800	Jan 2022	-		0.800	-	-	-
Integrated CID and EW NG	C/CPAF	Northrop Grumman : Baltimore, MD	-	0.100	May 2020	0.500	Jan 2021	0.700	Jan 2022	-		0.700	-	-	-
Kill Chain Weapons Integrated CID	C/CPAF	Raytheon : El Segundo, CA	-	0.450	Jan 2020	1.500	Jan 2021	1.500	Jan 2022	-		1.500	-	-	-
AFSIM Development	C/CPAF	TBD : TBD	-	0.200	Feb 2020	0.300	Feb 2021	0.200	Feb 2022	-		0.200	-	-	-
JMAC Integration	C/CPAF	TBD : TBD	-	0.240	Feb 2020	0.159	Feb 2021	-		-		-	-	-	-
XPatch Upgrades	C/CPAF	Leidos : Mclean, VA	-	0.250	Aug 2020	0.250	Aug 2021	0.000		-		0.000	-	-	-
Subtotal			-	21.209		20.124		16.180		-		16.180	-	-	N/A

Support (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Systems Engineering Support	MIPR	MITRE : Rome, NY	-	0.021	Dec 2019	0.000		-		-		-	-	-	-
Systems WSRI Support	C/CPAF	WSRI : Dayton, OH	-	0.050	Aug 2020	-		-		-		-	-	-	-
ECID MS&A	C/CPAF	TBD : TBD	-	0.000	Dec 2019	0.600	Dec 2020	-		-		-	-	-	-
Subtotal			-	0.071		0.600		-		-		-	-	-	N/A

Test and Evaluation (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Test and Evaluation	PO	704TSS : Holloman, NM	-	0.040	Jun 2020	-		-		-		-	-	-	-

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0603742F / <i>Combat Identification Technology</i>	Project (Number/Name) 642597 / <i>Noncooperative Identification Subsystems</i>
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Test and Evaluation (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Data Collection-AvMC	MIPR	AvMC : Huntsville, AL	-	0.189	Sep 2020	0.754	Feb 2021	-		-		-	-	-	-
Data Collection-Eglin	PO	96th Test Wing : Eglin AFB, FL	-	0.190	Mar 2020	-		-		-		-	-	-	-
Data Collection-Yuma	MIPR	Yuma Proving Ground : Yuma, AZ	-	0.100	Sep 2020	0.245	Feb 2021	-		-		-	-	-	-
Data Collection-NNSS	MIPR	NNSS : NNSS, NE	-	0.215	Sep 2020	0.090	Feb 2021	-		-		-	-	-	-
Data Collection	MIPR	TBD : TBD	-	0.776	Dec 2020	-		1.000	Feb 2022	-		1.000	-	-	-
Subtotal			-	1.510		1.089		1.000		-		1.000	-	-	N/A

Management Services (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
AFRL PMA	Various	Various : Various, OH	-	1.220	Mar 2020	0.263	Mar 2021	2.103	May 2022	-		2.103	-	-	-
Subtotal			-	1.220		0.263		2.103		-		2.103	-	-	N/A

			Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals			-	24.010	22.076	19.283	-	19.283	-	-	N/A

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0603742F / <i>Combat Identification Technology</i>	Project (Number/Name) 642597 / <i>Noncooperative Identification Subsystems</i>

	FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Combat Identification Technology																												
LASER VISION - VAMP																												
LASER VISION - VAMP POD Demo																												
LASER VISION - 3D Ladar (3DTO)																												
Hydra Vision/FJORD - Air to Air (2 & 3 Features) (TRL-6 begins 3Qt FY18)																												
Hydra Vision - Air to Air 2 Feature RT Demo																												
Hydra Vision - Air to Air 3 Feature RT Demo																												
Compact AiTR - Compact Feature AiTR																												
Passive RF ID (PRIDE)																												
Passive RF ID (PRIDE) - Lab Demo (Jun 2020)																												
Passive RF ID (PRIDE) - OPS Demo (Dec 2022)																												
Radio ID (RID) Integrated CID w/Electronic Warfare (ICE)																												
Radio ID n Lab Demo #2 (Jan 2021)																												
Radio ID - Flight Demo (Aug 2022)																												
Kill Chain Weapons Integration (KWIC)																												
Studies																												
Enhanced CID (ECID)																												

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Exhibit R-4A, RDT&E Schedule Details: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0603742F / <i>Combat Identification Technology</i>	Project (Number/Name) 642597 / <i>Noncooperative Identification Subsystems</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>Combat Identification Technology</i>				
LASER VISION - VAMP	1	2020	4	2021
LASER VISION - VAMP POD Demo	3	2021	3	2021
LASER VISION - 3D Ladar (3DTO)	1	2020	2	2020
Hydra Vision/FJORD - Air to Air (2 & 3 Features) (TRL-6 begins 3Qt FY18)	1	2020	4	2024
Hydra Vision - Air to Air 2 Feature RT Demo	1	2020	4	2022
Hydra Vision - Air to Air 3 Feature RT Demo	4	2020	4	2020
Compact AiTR - Compact Feature AiTR	1	2020	4	2022
Passive RF ID (PRIDE)	1	2020	2	2024
Passive RF ID (PRIDE) - Lab Demo (Jun 2020)	3	2020	3	2021
Passive RF ID (PRIDE) - OPS Demo (Dec 2022)	1	2023	1	2023
Radio ID (RID) Integrated CID w/Electronic Warfare (ICE)	1	2020	2	2025
Radio ID n Lab Demo #2 (Jan 2021)	2	2021	2	2021
Radio ID - Flight Demo (Aug 2022)	3	2022	3	2022
Kill Chain Weapons Integration (KWIC)	1	2020	4	2025
Studies	1	2020	4	2025
Enhanced CID (ECID)	1	2020	1	2024

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 4					R-1 Program Element (Number/Name) PE 0603742F / <i>Combat Identification Technology</i>				Project (Number/Name) 642599 / <i>Cooperative Identification Techniques</i>			
COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
642599: <i>Cooperative Identification Techniques</i>	-	2.040	2.076	0.000	0.000	0.000	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Cooperative Combat Identification employs technologies required to rapidly identify friendly platforms. The program develops, integrates and evaluates technologies that provide Air Force platforms with a means of positively identifying an air or ground platform as a friendly, via active or passive cooperative identification capabilities. The development funded by this project ensures availability of a Mode 5 upgrade path for implementing ground and air platforms across the Air Force fleet. The Department of Defense International AIMSP0 has system level interoperability testing and certification responsibilities for the present Mark XIIB system, development and integration of new Identification Friend or Foe (IFF) system capabilities, and development/integration of civil Mode S capabilities into Mark XIIB Identification Friend or Foe equipment. The AIMSP0 ensures Identification Friend or Foe equipment/platform functionality in accordance with established standards and ensures total system interoperability to meet Department of Defense/Service mission areas (e.g. Offensive Counter Air, Defensive Counter Air, and Integrated Air and Missile Defense).

The cooperative goals will be to test and certify the Mark XIIB system, develop and integrate the new Mark XIIB Identification Friend or Foe system capability (Mode 5 Level 2 Broadcast) and also continue the development/integration of civil Mode S capabilities into Mark XIIB Identification Friend or Foe equipment using newly fielded M-code GPS receivers.. The cooperative funds will be used to fund projects and personnel who develop and test technical standards, perform certification testing, process certifications and track all Office of the Secretary of Defense and Federal Aviation Administration guidelines to ensure the program remains current. The Office of the Secretary of Defense and Federal Aviation Administration guidelines required Mode 5 be fully implemented by FY 2020 but many platforms continue to integrate this capability. The Department of Defense AIMS Program will ensure those certifications are current on all applicable platforms/systems and work with both domestic and foreign military sales partners to ensure compliance. The funds also support Department of Defense representation to several military (United States and NATO) and civil (Federal Aviation Administration, International Civil Aviation Organization and Radio Technical Commission for Aeronautics) requirements meetings for Mode 5, Mode S and ADS-B. These important meetings allow the Department of Defense to remain interoperable with our foreign military partners as well as the United States, and international civil aviation community. Department of Defense AIMS Program will continue to update the Department of Defense AIMS Mark XIIB Standards, Security Classification Guide, Handbook, and Test Requirements.

B. Accomplishments/Planned Programs (\$ in Millions)

	FY 2020	FY 2021	FY 2022
Title: Air Traffic Control and Radar Beacon Systems Identification Friend or Foe Mark XIIB System (AIMS) Program Office	2.040	2.076	0.000
Description: Develop and maintain technical standards on development, integration, testing, and certification of Department of Defense Identification Friend or Foe equipment. Coordinate and execute equipment/subsystem-level certifications and platform certifications of Identification Friend or Foe capabilities (298 Mode 5 certifications were completed in FY20). Support Foreign Military Sales of the United States Identification Friend and Foe equipment. Currently managing 49 active Foreign Military Sales Cases. Support NATO Identification Friend or Foe Capabilities Team (Mode 5 Identification Friend or Foe is a NATO waveform).			

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force		Date: May 2021		
Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0603742F / <i>Combat Identification Technology</i>	Project (Number/Name) 642599 / <i>Cooperative Identification Techniques</i>		
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2020	FY 2021	FY 2022
<p>Support International Civil Aviation Organization (ICAO) Technical Support Group (develops standards for world-wide civil Air Traffic Control). Create and maintain civil Mode S address assignments and military Mode 5 Platform Identification Number assignments for every Department of Defense platform using these waveforms in their interrogator and/or transponder equipment.</p> <p>FY 2021 Plans: Will continue to fund AIMS for interoperability Identification Friend testing (civil and military), Federal Aviation Administration liaison, to support of Mode 4/Mode 5 equipment, updating and developing Identification Friend standards.</p> <p>FY 2022 Plans: In FY 2022, this work will be performed under PE 0207420F Combat Identification.</p> <p>FY 2021 to FY 2022 Increase/Decrease Statement: Funding from FY 2021 to FY 2022 decrease by \$2.076 million. The decrease is due to realignment of funds to PE 0207420F Combat Identification.</p>				
Accomplishments/Planned Programs Subtotals		2.040	2.076	0.000
C. Other Program Funding Summary (\$ in Millions)				
N/A				
Remarks				
D. Acquisition Strategy				
<p>Combat Identification develops technologies for exploitation by the United States Air Force and the other services. Award multiple, competitive contract vehicles emphasizing off-the-shelf technology and maximizing the use of non-developmental items (NDIs). Management develops a technology to a point it can be demonstrated in a relative combat environment.</p>				

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Exhibit R-4, RDT&E Schedule Profile: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0603742F / <i>Combat Identification Technology</i>	Project (Number/Name) 642599 / <i>Cooperative Identification Techniques</i>

FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

<i>Cooperative Identification Techniques</i>	
AIMS Program Office Activities	████████████████████
AIMS Program Office Annual User Working Group (May 2021)	████

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Exhibit R-4A, RDT&E Schedule Details: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0603742F / <i>Combat Identification Technology</i>	Project (Number/Name) 642599 / <i>Cooperative Identification Techniques</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>Cooperative Identification Techniques</i>				
AIMS Program Office Activities	1	2021	4	2021
AIMS Program Office Annual User Working Group (May 2021)	3	2021	3	2021

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force										Date: May 2021		
Appropriation/Budget Activity 3600 / 4					R-1 Program Element (Number/Name) PE 0603742F / <i>Combat Identification Technology</i>				Project (Number/Name) 643420 / <i>Combat ID Database Development</i>			
COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
643420: <i>Combat ID Database Development</i>	-	5.317	2.196	2.656	0.000	2.656	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Database Initiative (DBI) is a project designed to remove the "hard-coded" static identification (ID) parameters (typically updated every 4-5 years) from the host platform's sensor(s) and replace them with parameterized values that are easily and quickly updated when new intelligence inputs come available (this allows maximum flexibility to tailor each aircraft's Combat Identification database(s) based on assigned theater of operation, threat country of interest, and assigned mission tasks). This project primarily consists of four objectives: A.) determining a sensor's requisite identification parameters for combat identification, B) designing and developing a database to contain the combat identification parameters identified in Objective A, C) developing techniques to generate the requisite parameters, and D) provide combat identification parameters developed from measured or modeled data.

In FY22, the Database effort will focus on air target features associated with the Joint Multi-sensor Advanced Combat Identification (JMAC) architecture described above. The team expects to develop specific feature sets in FY21, and will conduct a real-time database insertion demonstration in an F-15 System Integration Laboratory. This will lead to the maturation of further Joint Multi-sensor Advanced Combat Identification feature sets that will provide progressively improved Combat Identification improvement. Feature sets for other Combat Identification modalities will be added over time (specifically, ground radar modes).

This program element may include necessary civilian pay expenses required to manage, execute, and deliver Combat Identification technologies. The use of such program funds would be in addition to the civilian pay expenses budgeted in program element 0605831F.

This effort is in Budget Activity 4, Advanced Component Development and Prototypes (ACD&P), because efforts are necessary to evaluate integrated technologies, representative modes or prototype systems in a high fidelity and realistic operating environment.

B. Accomplishments/Planned Programs (\$ in Millions)

	FY 2020	FY 2021	FY 2022
Title: Database Development	0.900	2.196	2.656
Description: Develop techniques to remove the "hard-coded" static ID parameters from the host platform's sensor and replace them with parameterized values that are dynamic.			
FY 2021 Plans:			
- Determine the requisite Combat Identification features for high range resolution radar (HHR) and non-cooperative target recognition (NCTR) air-to-air radar modes.			
- Specify the requirements for initial Combat Identification database design for these radar modes			

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0603742F / <i>Combat Identification Technology</i>	Project (Number/Name) 643420 / <i>Combat ID Database Development</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2020	FY 2021	FY 2022
- Collect initial sample data to populate the high range resolution radar (HHR) and non-cooperative target recognition (NCTR) databases for developmental test/debug			
<i>FY 2022 Plans:</i> Continue to collect data to populate the high range resolution radar (HHR) and non-cooperative target recognition (NCTR) databases for developmental test/debug. Develop techniques to remove the "hard-coded" static ID parameters from the host platform's sensor and replace them with parameterized values for Joint Multi-sensor Advanced Combat Identification (JMAC) architecture.			
<i>FY 2021 to FY 2022 Increase/Decrease Statement:</i> FY 2022 increased compared to FY 2021 by \$0.460 million. Justification for this increase is described in plans above.			
Accomplishments/Planned Programs Subtotals	0.900	2.196	2.656

	FY 2020	FY 2021
<i>Congressional Add:</i> Trusted Time Loaders	4.417	0.000
<i>FY 2020 Accomplishments:</i> Conducted Congressional directed efforts		
<i>FY 2021 Plans:</i> Not applicable		
Congressional Adds Subtotals	4.417	0.000

C. Other Program Funding Summary (\$ in Millions)

N/A

Remarks

D. Acquisition Strategy

Combat Identification develops technologies for exploitation by the USAF and the other services. Award multiple, competitive contract vehicles emphasizing off-the-shelf technology and maximizing the use of non-developmental items (NDIs). Management develops a technology to a point it can be demonstrated in a relative combat environment.

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Exhibit R-4, RDT&E Schedule Profile: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0603742F / <i>Combat Identification Technology</i>	Project (Number/Name) 643420 / <i>Combat ID Database Development</i>

FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

<i>Combat ID Database Development</i>	
Combat ID Database Development	

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Exhibit R-4A, RDT&E Schedule Details: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0603742F / <i>Combat Identification Technology</i>	Project (Number/Name) 643420 / <i>Combat ID Database Development</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>Combat ID Database Development</i>				
Combat ID Database Development	3	2020	4	2025

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 0603790F / NATO Research and Development
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COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
Total Program Element	-	4.774	3.640	4.114	0.000	4.114	-	-	-	-	-	-
64NATO: <i>Nato Coop R&D</i>	-	4.774	3.640	4.114	0.000	4.114	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-	-	-

Note

In FY 2016, PE 0603791F, International Space Cooperative Research & Development, Project 645035, International Space Coop R&D, efforts were transferred to PE 0603790F, NATO Research and Development, Project 64NATO, NATO Coop R&D, in order to consolidate international cooperative research and development activities.

A. Mission Description and Budget Item Justification

These funds will be used to initiate air, space, and cyber international cooperative research, and development (ICR&D) agreements with North Atlantic Treaty Organization (NATO) member states, major non-NATO allies and friendly foreign countries. Each of the selected activities and projects are required to have a concluded international agreement (IA), prior to funds being released, that implements the provisions of Title 10 U.S. Code, Section 2350a. This legislation (Title 10 U.S. Code, Section 2350) authorizes funds to significantly improve U.S. and allied conventional defense capabilities by leveraging the best defense technologies, eliminating costly duplication of R&D efforts, accelerating the availability of defense systems, and promoting US and allied interoperability or commonality. These funds will not be used for government civilian salaries, permanent construction, or spent overseas. This program element funds the implementation of Air Force ICR&D agreements in (1) Basic Research (2) Applied Research (3) Advanced Technology Development (4) Advanced Component Development and Prototypes (5) System Development and Demonstration and (6) RDT&E Management Support.

This effort is in Budget Activity 4, Advanced Component Development and Prototypes (ACD&P), because efforts are necessary to evaluate integrated technologies, representative modes or prototype systems in a high fidelity and realistic operating environment.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force	Date: May 2021
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Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 0603790F / NATO Research and Development
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B. Program Change Summary (\$ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Previous President's Budget	4.955	3.647	4.141	0.000	4.141
Current President's Budget	4.774	3.640	4.114	0.000	4.114
Total Adjustments	-0.181	-0.007	-0.027	0.000	-0.027
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	-0.181	0.000			
• Other Adjustments	0.000	-0.007	-0.027	0.000	-0.027

Change Summary Explanation

FY22 funds decreased by \$.027M to support other Air Force Requirements.

C. Accomplishments/Planned Programs (\$ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Title: International Cooperative Research and Development	4.774	3.640	4.114	0.000	4.114
Description: Supports bi- and multi-lateral international agreements that meet USAF RDT&E objectives and goals. Each of the cooperative projects that receive funding must meet one or more of the following requirements: enhance warfighter capabilities and coalition interoperability; accelerate the availability of defense systems; strengthen and reinforce strategic partnerships; gain access to the best defense technologies, capabilities and techniques; build relationships and influence with allies; and/or eliminate duplication of R&D efforts.					
FY 2021 Plans:					
FY21 cooperative projects involve RDT&E efforts in Artificial Intelligence, directed energy, hypersonics, Autonomy, human performance, information systems, aerospace systems, munitions, materials and manufacturing, sensors, space situational awareness, missile warning, military satellite communications, global positioning systems, responsive space capabilities, cyber network defense and information assurance, and space vehicles. These projects include but are not limited to: Development of Emerging Additive Manufacturing Technologies (DAWN); Mission Planning for Photonic Systems; Micro-Satellite Military Utility (MSMU) Ground Station Interoperability; Improved Technology for High-temperature Alloys Necessary to Optimize Small Supersonic Systems (I-THANOS3); Himalayan Eagle; Ignition Optimization Using Pulsed Discharge; Selected					

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force	Date: May 2021
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Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 0603790F / NATO Research and Development
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C. Accomplishments/Planned Programs (\$ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
<p>Cyber Information Exchange; Next Generation EO IR Sensor Technology (NGIEST); Solid State High Power Microwave 'Cannon'; HPM Target Effects & Weaponization; Deep Space Radar; Confined Quantum Sensors; Embedded Flow Control for Low Pressure Turbines (LPTs); Sensors & PID (Positive threat Identification) Enhanced Model for Directed Energy; Hybrid Ultra-Wide/Narrow Band Directed Energy Weapon (DEW); Quantum Sensors for Ephemeris-Free Space Operations; Improved HPEM Elements for Next Generation RF-Directed Energy Weapons; and Intelligent Adaptive Collaborative Teaming Technologies (IACTT). These projects involved interoperability in cooperative R&D ventures with these Allies, Major Non-NATO Allies and Strategic Partners: Australia, Estonia, Israel, Germany, Canada, United Kingdom, Italy, Netherlands, Norway, New Zealand, India, Republic of Korea, Japan, and Singapore.</p> <p>N/A</p> <p>FY 2022 Base Plans: FY22 cooperative projects involve RDT&E efforts in Artificial Intelligence, directed energy, hypersonics, Autonomy, human performance, information systems, aerospace systems, munitions, materials and manufacturing, sensors, local area airbase / airfield defense, machine learning, space situational awareness, missile warning, military satellite communications, global positioning systems, responsive space capabilities, cyber network defense, sensors, information assurance, and space vehicles. These projects include but are not limited to: Joint Advanced Laser Integration (JAVALIN), Confined Quantum Sensors, Military Applications of Laser Produced Particle Beams, Solid State High Power Microwave "Cannon", DEAD AIM, Advanced Electro-Optic Modulators for Enhancing RF Photonic Systems, Intelligent Adaptive Collaborative Teaming Technologies (iACTT), Hyperspectral Detection / ID with EO / IR Fusion (HyDEF), Quick Reaction Laser Assessment Sensor, Advanced Data Analytics for C4ISR, MADCAP, Ranging of GEO Uncooperative Entities (RoGUE), Improved HPEM Elements for Next Generation, RF-Directed Energy Weapons, AI Based ISR for Contested and Diverse Environments, Autonomous Drone Swarm for Airfield and Runway Inspection, Operational Research Collaboration for Human Improvement in Defense (ORCHID), Multimodal Open Source Analytic Insights for C4ISR (MOSAIC), Dynamic Material Analysis Fatigue Life, Sustainment and Augmentation of the Military Enterprise through Synthetic Biology Engineering, Corrosion: Modeling and Accelerated Testing, and Damaged Composite Airframe Management Tools. International Cooperation are with but not limited to the following partners: Australia, Canada, Estonia, France, Germany, India, Italy, Israel, Japan, Netherlands, Norway, Republic of Korea, Singapore, Sweden, Switzerland, and United Kingdom.</p> <p>FY 2022 OCO Plans:</p>					

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force	Date: May 2021
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Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 0603790F / NATO Research and Development
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C. Accomplishments/Planned Programs (\$ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
None / N/A					
<i>FY 2021 to FY 2022 Increase/Decrease Statement:</i> The funds increased is attributed to higher program demand and the projects identified in the FY22 Base Plan. This program is a vital building and sustaining partnership enabler providing the Department of Air Force, US Air Force and US Space Force, the strategic direction in collaboration with our Allies and Strategic Partners.					
Accomplishments/Planned Programs Subtotals	4.774	3.640	4.114	0.000	4.114

D. Other Program Funding Summary (\$ in Millions)

N/A

Remarks

E. Acquisition Strategy

A principal goal of the NATO Cooperative R&D program is to effectively utilize the aggregate resources invested by the US and our allies in air, space, and cyber R&D. This program element provides the critical funding incentive needed to pursue air, space and cyber related International Cooperative Research Development and Acquisition (ICRD&A) agreements and helps to (a) leverage USAF and allied resources through cost sharing and economies of scale; (b) exploit the best US and allied technologies for equipping coalition forces; (c) demonstrate areas of commonality or interoperability with our allies; and (d) accelerate the availability of defense technology and systems. Candidate projects are reviewed against USAF goals, DoD objectives, and warfighter needs prior to being approved. An international agreement defining project objectives, responsibilities and costs is required prior to release of funds. To obtain these funds and ensure service commitment, projects are selected from existing or new RDT&E programs funded in the Future Years Defense Plan (FYDP). Project offices must show matching funds and contributions from associated program elements and equitable allied funding. As appropriate, funding responsibility for out-year requirements and follow-on efforts are transferred to the project office and associated program elements. Any new contracts are awarded after full and open competition.

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Exhibit R-4A, RDT&E Schedule Details: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0603790F / NATO Research and Development	Project (Number/Name) 64NATO / Nato Coop R&D

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
NATO Coop R&D				
FY22 ICR&D Projects - Call Letter	2	2020	3	2020
FY22 ICR&D Projects - nomination package development	2	2020	3	2020
FY22 ICR&D Projects - Review panel	3	2020	3	2020
FY22 ICR&D Projects - Coordination of review panel results	4	2020	4	2020
FY22 ICR&D Approved Project Letter to the MAJCOMs	4	2020	4	2020
FY22 ICR&D Projects - Agreement development, negotiations, and signature	1	2021	2	2022
FY22 ICR&D Projects - RDTE cooperative project work	1	2021	2	2022

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 0603851F / <i>Intercontinental Ballistic Missile - Dem/Val</i>
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COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
Total Program Element	-	29.881	32.899	49.621	0.000	49.621	-	-	-	-	-	-
641020: <i>ICBM Guidance Applications</i>	-	5.184	3.608	8.022	0.000	8.022	-	-	-	-	-	-
641021: <i>ICBM Propulsion Applications</i>	-	0.000	6.954	0.000	0.000	0.000	-	-	-	-	-	-
641022: <i>ICBM Reentry Vehicle Applications</i>	-	17.060	22.337	18.166	0.000	18.166	-	-	-	-	-	-
641024: <i>ICBM Command & Control (C2) Applications</i>	-	3.713	0.000	0.000	0.000	0.000	-	-	-	-	-	-
644209: <i>Long Range Planning (LRP)</i>	-	3.924	0.000	23.433	0.000	23.433	-	-	-	-	-	-

A. Mission Description and Budget Item Justification

This program ensures a responsive design and development engineering infrastructure to address emerging issues and technology insertion/technology application on legacy and future Intercontinental Ballistic Missile (ICBM), and other common strategic deterrent mission areas to develop enhanced multi-use capabilities. The ICBM Dem/Val program will provide technology maturation and risk reduction activities to support Minuteman (MM) III sustainment, MM III to GBSD transition, and future ICBM systems development. ICBM Dem/Val conducts advanced component development and prototyping to validate emerging strategic missile technologies and future upgrades to the ICBM. Efforts will identify methods to improve system performance, develop potential future RV designs, mitigate evolving threats, reduce life cycle costs, develop/expand modeling/simulation and experimental platforms for weapon qualification activities, improve nuclear safety and surety, and ensure both viability and durability of strategic missile systems.

The ICBM Dem/Val program will develop key enabling engineering tools for the ICBM mission to include MBSE, test software, and modernization of existing analytical tools. This program will leverage modular system, open architecture and agile software development to build key enabling engineering tools and future upgrades to ICBMs.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver weapon system capability. The use of such programs funds would be in addition to the civilian pay expenses budgeted in program element 0605831F. In FY20 \$0M was expended for civilian pay expenses in this program element, and in FY21 \$0M is forecasted for civilian pay expenses in this program element.

This effort is in Budget Activity 4, Advanced Component Development and Prototypes (ACD&P), because efforts are necessary to evaluate integrated technologies, representative modes or prototype systems in a high fidelity and realistic operating environment.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force	Date: May 2021
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Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 0603851F / <i>Intercontinental Ballistic Missile - Dem/Val</i>
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B. Program Change Summary (\$ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Previous President's Budget	30.969	32.959	55.370	0.000	55.370
Current President's Budget	29.881	32.899	49.621	0.000	49.621
Total Adjustments	-1.088	-0.060	-5.749	0.000	-5.749
• Congressional General Reductions	0.000	-0.060			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	-1.088	0.000			
• Other Adjustments	0.000	0.000	-5.749	0.000	-5.749

Change Summary Explanation

Fiscal Year 2020 funding reflects a \$1.088 million reduction for Small Business Innovation Research (SBIR).
 Fiscal Year 2021 reflects a Congressional General Reduction of \$0.060 million for an undistributed mark.
 Fiscal Year 2022 reflects a \$5 million reduction for higher Air Force priorities and a \$0.749 million inflation adjustment.

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force										Date: May 2021		
Appropriation/Budget Activity 3600 / 4					R-1 Program Element (Number/Name) PE 0603851F / <i>Intercontinental Ballistic Mis sile - Dem/Val</i>				Project (Number/Name) 641020 / <i>ICBM Guidance Applications</i>			
COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
641020: <i>ICBM Guidance Applications</i>	-	5.184	3.608	8.022	0.000	8.022	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Guidance Applications Program (GAP) ensures the development of strategic capability in response to the Nuclear Posture Review, recommendations of the United States Strategic Command (USSTRATCOM) Strategic Advisory Group, USSTRATCOM Commander Guidance, and the Defense Science Board Task Force on Nuclear Deterrence. The program studies and assesses both legacy and future ICBM Guidance System technology applications. Efforts are focused on current and future requirements and technologies, reduced life cycle costs, and increased nuclear surety and safety. Activities leverage the efforts of the Science and Technology community and are coordinated with the Navy strategic applications program to enhance synergy and avoid duplication. Key elements include developing responsive technologies with common applications for future strategic guidance capabilities. This program also includes any needed nuclear surety and certification and system vulnerability assessments.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver weapon system capability. The use of such programs funds would be in addition to the civilian pay expenses budgeted in program element 0605831F. In FY20 \$0M was expended for civilian pay expenses in this program element, and in FY21 \$0M is forecasted for civilian pay expenses in this program element.

B. Accomplishments/Planned Programs (\$ in Millions)

	FY 2020	FY 2021	FY 2022
Title: Guidance Applications Program	5.184	3.608	8.022
Description: Develop and mature advanced technologies and concepts to support future requirements.			
FY 2021 Plans:			
<ul style="list-style-type: none"> • Continue the evaluation and testing of strategic and space guidance-related commodities within market for potential use in a future ICBM strategic guidance system; coordinate with the Navy strategic applications program. • Continue development of a Micro-Electro Mechanical System for potential insertion into the Path Length Module. • Continue expanding the Strategic Guidance Hardware independent validation & verification capability to include multi-G force environment and other various environments; perform Guidance analyses and Guidance technology studies. • Continue evaluating emerging strategic instrument technologies for future strategic grade gyros and accelerometers to ensure appropriate test capability development, to include gyrometer and nested IMU development. • Rapidly respond to evolving warfighter priorities and emerging requirements. 			
FY 2022 Plans:			
<ul style="list-style-type: none"> • Conclude development of a Micro-Electro Mechanical System for potential insertion into the Path Length Module. 			

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0603851F / <i>Intercontinental Ballistic Mis sile - Dem/Val</i>	Project (Number/Name) 641020 / <i>ICBM Guidance Applications</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2020	FY 2021	FY 2022
<ul style="list-style-type: none"> •Continue evaluating emerging strategic instrument technologies for future strategic grade gyros and accelerometers to ensure appropriate test capability development, to include gyrometer and nested IMU development. • Rapidly respond to evolving warfighter priorities and emerging requirements. <p><i>FY 2021 to FY 2022 Increase/Decrease Statement:</i> Funding increased due to ramp up of Emerging Strategic Instrumentation effort.</p>			
Accomplishments/Planned Programs Subtotals	5.184	3.608	8.022

C. Other Program Funding Summary (\$ in Millions)											
<u>Line Item</u>	<u>FY 2020</u>	<u>FY 2021</u>	<u>FY 2022</u> <u>Base</u>	<u>FY 2022</u> <u>OCO</u>	<u>FY 2022</u> <u>Total</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>FY 2026</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• RDTE 04 PE 0605230F: <i>GBSD</i>	538.643	1,447.113	2,570.442	-	2,570.442	-	-	-	-	-	-

Remarks

D. Acquisition Strategy

Accomplish studies, analyses, concept development and engineering; efforts will be conducted using contracting strategies deemed most appropriate, generally using competitive contracts and/or other obligating documentation considered most appropriate by obligating and performing agencies involved. Current effort deliverables to include strategic grade guidance prototypes to support multiple ongoing Air Force initiatives.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0603851F / <i>Intercontinental Ballistic Mis sile - Dem/Val</i>	Project (Number/Name) 641020 / <i>ICBM Guidance Applications</i>
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Test and Evaluation (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
GAP Micro-Electronic Module System	Various	Various : Various	-	1.199	Jan 2020	1.000	Jan 2021	0.878	Dec 2021	-		0.878	-	-	-
GAP Emerging Strategic Instrument	Various	Various : Various	-	3.983	Jan 2020	2.403	Jan 2021	6.682	Dec 2021	-		6.682	-	-	-
Subtotal			-	5.182		3.403		7.560		-		7.560	-	-	N/A

Management Services (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
GAP, Program Management Administrative Support Services	C/Various	Various : Various	-	0.002	Jan 2020	0.205	Jan 2021	0.462	Dec 2021	-		0.462	-	-	-
Subtotal			-	0.002		0.205		0.462		-		0.462	-	-	N/A

	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals		-	5.184	3.608	8.022	-	-	8.022	N/A

Remarks
GAP Emerging Strategic Instruments increased due to ramp up of Sparrow project.

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Exhibit R-4A, RDT&E Schedule Details: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0603851F / <i>Intercontinental Ballistic Mis sile - Dem/Val</i>	Project (Number/Name) 641020 / <i>ICBM Guidance Applications</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
GAP				
GAP Micro-Electronic Module System	1	2020	4	2022
GAP Emerging Strategic Instrument Technology Requirements	1	2020	4	2024

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force										Date: May 2021		
Appropriation/Budget Activity 3600 / 4					R-1 Program Element (Number/Name) PE 0603851F / <i>Intercontinental Ballistic Missile - Dem/Val</i>				Project (Number/Name) 641021 / <i>ICBM Propulsion Applications</i>			
COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
641021: <i>ICBM Propulsion Applications</i>	-	0.000	6.954	0.000	0.000	0.000	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Propulsion Applications Program (PAP) develops and assesses strategic propulsion system technology applications for both legacy and future ICBM propulsion systems through projects exploring improvements and/or alternatives to current propulsion systems, conducting studies assessing application of new technologies to meet future common propulsion systems requirements, and assessing opportunities for applying common materials and technology between the ICBM, submarine-launched ballistic missile (SLBM) propulsion systems, and other rocket motor propulsion capabilities. Efforts are focused on current and future requirements and technologies, reduced life cycle costs, and increased nuclear surety, safety, certification and system vulnerability assessments.

This program element may include necessary emergent or unanticipated civilian pay expenses required to manage, execute, and deliver ICBM Demonstration/Validation for emergent or unanticipated weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program elements 0605833F or 0605831F.

B. Accomplishments/Planned Programs (\$ in Millions)

	FY 2020	FY 2021	FY 2022
Title: Propulsion Applications Program	0.000	6.954	0.000
Description: Assess, develop, evaluate, and demonstrate common solid and liquid propulsion technology and manufacturing leading up to a static fire and test of strategic propulsion systems; develop capability and explore improvements to current and future propulsion systems; and support the research and development industrial base and critical infrastructure.			
FY 2021 Plans:			
<ul style="list-style-type: none"> • Initiate propellant studies to develop alternative propulsion systems for future ICBM program insertion. • Initiate propulsion system studies to develop low-toxic propellant formulations for future ICBM program insertion. • Continue to monitor emerging technologies to rapidly respond to warfighter priorities and emerging requirements. • Initiate stand up of a developmental flight test capability to test relevant technologies in a real world operational setting. 			
FY 2022 Plans:			
N/A			
FY 2021 to FY 2022 Increase/Decrease Statement:			
Funding decreased to due funding being realigned to LRP for the developmental flight test.			
Accomplishments/Planned Programs Subtotals	0.000	6.954	0.000

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0603851F / <i>Intercontinental Ballistic Mis sile - Dem/Val</i>	Project (Number/Name) 641021 / <i>ICBM Propulsion Applications</i>

C. Other Program Funding Summary (\$ in Millions)

<u>Line Item</u>	<u>FY 2020</u>	<u>FY 2021</u>	<u>FY 2022</u> <u>Base</u>	<u>FY 2022</u> <u>OCO</u>	<u>FY 2022</u> <u>Total</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>FY 2026</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• RDTE 04 PE 0605230F: <i>GBSD</i>	538.643	1,447.113	2,570.442	-	2,570.442	-	-	-	-	-	-

Remarks

D. Acquisition Strategy

Studies, analyses, limited engineering, hardware development and/or testing will be accomplished; efforts will be conducted using contracting strategies deemed most appropriate, generally using competitive contracts and/or other obligating documentation considered most appropriate by obligating and performing agencies involved. Current effort deliverables include flight test demonstrations to support multiple studies.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0603851F / <i>Intercontinental Ballistic Mis sile - Dem/Val</i>	Project (Number/Name) 641021 / <i>ICBM Propulsion Applications</i>
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Test and Evaluation (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Developmental Test Flight	Various	Various : Various	-	-		6.675	Apr 2021	0.000		-		0.000	-	-	-
Subtotal			-	-		6.675		0.000		-		0.000	-	-	N/A

Management Services (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
PAP Program Management Administration	Various	Various : Various	-	0.000	Jan 2020	0.279	Jan 2021	0.000		-		0.000	-	-	-
Subtotal			-	0.000		0.279		0.000		-		0.000	-	-	N/A

			Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals			-	0.000	6.954	0.000	-	0.000	-	-	N/A

Remarks
The developmental test flight enables us to demonstrate developing technologies in relevant ICBM environments.

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Exhibit R-4, RDT&E Schedule Profile: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0603851F / <i>Intercontinental Ballistic Mis sile - Dem/Val</i>	Project (Number/Name) 641021 / <i>ICBM Propulsion Applications</i>

FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

PAP	
Developmental Test Flight	██████████

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Exhibit R-4A, RDT&E Schedule Details: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0603851F / <i>Intercontinental Ballistic Mis sile - Dem/Val</i>	Project (Number/Name) 641021 / <i>ICBM Propulsion Applications</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
PAP				
Developmental Test Flight	2	2021	4	2021

Note
Developmental Test Flight is transitioning to LRP in FY22

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force										Date: May 2021		
Appropriation/Budget Activity 3600 / 4					R-1 Program Element (Number/Name) PE 0603851F / <i>Intercontinental Ballistic Mis sile - Dem/Val</i>				Project (Number/Name) 641022 / <i>ICBM Reentry Vehicle Applications</i>			
COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
641022: <i>ICBM Reentry Vehicle Applications</i>	-	17.060	22.337	18.166	0.000	18.166	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Reentry Vehicle Applications Program (RVAP) ensures the ICBM force is equipped with the safest, most reliable, most survivable Reentry Systems, and explores options for common, multi-mission capabilities. The program enables a responsive engineering infrastructure by developing modeling/simulation, ground and flight test platforms to support Reentry System qualifications. The program ensures the availability of long-lead components and materials while identifying life cycle cost reduction methods. In addition, the program matures and tests advanced Reentry System technologies and designs to meet future requirements. This includes studying and assessing technology applications relevant to Mk12A, Mk21, Mk21A and future ICBM Reentry Systems. The program leverages investments by the Science & Technology community and Navy reentry systems applications program. Testing may occur on a space available basis on Air Force and Navy Force Development Evaluation (FDE) flights.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver weapon system capability. The use of such programs funds would be in addition to the civilian pay expenses budgeted in program element 0605831F. In FY20 \$0M was expended for civilian pay expenses in this program element, and in FY21 \$0M is forecasted for civilian pay expenses in this program element.

B. Accomplishments/Planned Programs (\$ in Millions)

	FY 2020	FY 2021	FY 2022
Title: Reentry Vehicle Applications Program	17.060	22.337	18.166
Description: Mature, evaluate, and test reentry system materials, technologies, and vehicles including modeling/simulation, and ground and flight test platforms for use in current and future strategic applications.			
FY 2021 Plans:			
<ul style="list-style-type: none"> • Conduct materials development, prototyping, and test. • Develop new modeling/simulation and flight test platforms for future weapon qualification activities. • Continue study for future RV concepts. • Continue materials test platform on orbital vehicle. • Rapidly respond to evolving warfighter priorities and emerging requirements. • Develop designs and production concepts for trusted radiation-hardened advanced microelectronics. • Continue design of Virtual Environment Trainer for ICBM Platforms. • Design predictive health management tool based on engineering predictive analysis. • Continue supporting the Joint Technology Demonstrator 			

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0603851F / <i>Intercontinental Ballistic Mis sile - Dem/Val</i>	Project (Number/Name) 641022 / <i>ICBM Reentry Vehicle Applications</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2020	FY 2021	FY 2022
<ul style="list-style-type: none"> Initiate developmental flight test capability. <p>FY 2022 Plans:</p> <ul style="list-style-type: none"> Continue new modeling/simulation and flight test platforms for future weapon qualification activities. Continue study for future RV concepts. Develop designs and production concepts for trusted radiation-hardened advanced microelectronics. Design predictive health management tool based on engineering predictive analysis. Conclude design of Virtual Environment Trainer for ICBM Platforms. Initiate thermal protection systems (TPS) materials research. Initiate digital engineering research. Initiate Rad Hard Non-Volatile Memory research. Initiate Rad Hard Radar research. Continue the Joint Technology Demonstrator effort. Rapidly respond to evolving warfighter priorities and emerging requirements. <p>FY 2021 to FY 2022 Increase/Decrease Statement: Funds decreased due to funding being realigned to LRP for the developmental flight test.</p>			
Accomplishments/Planned Programs Subtotals	17.060	22.337	18.166

C. Other Program Funding Summary (\$ in Millions)											
<u>Line Item</u>	<u>FY 2020</u>	<u>FY 2021</u>	<u>FY 2022</u> <u>Base</u>	<u>FY 2022</u> <u>OCO</u>	<u>FY 2022</u> <u>Total</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>FY 2026</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• RDTE 04 0605230F: <i>Ground Based Strategic Deterrent</i>	538.643	1,447.113	2,570.442	-	2,570.442	-	-	-	-	-	-
• RDTE 07 0101328F: <i>ICBM Reentry Vehicles</i>	63.484	112.547	86.313	-	86.313	-	-	-	-	-	-

Remarks

D. Acquisition Strategy
Studies, analyses, limited engineering, and pre-prototype hardware development will be accomplished; efforts will be conducted using contracting strategies deemed most appropriate, generally using competitive contracts and/or other obligating documentation considered most appropriate by obligating and performing agencies involved. Current effort deliverables include various technologies for ICBM re-entry vehicles including modeling and simulation software, alternate high temperature materials, advanced concepts, and radiation-hardened microelectronics.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0603851F / <i>Intercontinental Ballistic Missile - Dem/Val</i>	Project (Number/Name) 641022 / <i>ICBM Reentry Vehicle Applications</i>
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Support (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
RVAP Support	C/FFP	BAE Systems : Clearfield, UT	-	2.810	Mar 2020	1.800	Mar 2021	2.800	Dec 2021	-		2.800	-	-	-
RVAP Study Support	C/FFP	Aerospace : Various	-	1.710	Jan 2020	0.850	Jan 2021	0.850	Dec 2021	-		0.850	-	-	-
RVAP Engineering Support	C/FFP	MITRE : Various	-	-		-		0.500	Dec 2021	-		0.500	-	-	-
Subtotal			-	4.520		2.650		4.150		-		4.150	-	-	N/A

Test and Evaluation (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
RVAP Joint Technology Demonstrator	MIPR	SNL and LLNL : Various	-	0.800	Jan 2020	0.500	May 2021	1.000	Dec 2021	-		1.000	-	-	-
RVAP Flight Materials Test Platform	MIPR	SAF/FMBIB : Various	-	0.500	Jul 2020	0.000		-		-		-	-	-	-
RVAP Modeling and Simulation Programs	Various	Various : Various	-	1.539	Feb 2020	1.300	Feb 2021	0.500	Dec 2021	-		0.500	-	-	-
RVAP Nosetip Studies	Various	Various : Various	-	1.000	Apr 2020	-		-		-		-	-	-	-
RVAP Advanced Concept Studies	Various	Various : Various	-	6.047	Dec 2019	5.100	Jan 2021	4.000	Dec 2021	-		4.000	-	-	-
RVAP Aeroshell Studies	Various	Various : Various	-	0.000	Jan 2020	-		-		-		-	-	-	-
RVAP Virtual Environment Trainer	C/CPFF	By Light Professional IT : Orlando, FL	-	2.000		2.200	Apr 2021	0.500	Dec 2021	-		0.500	-	-	-
RVAP Radiation-Hardened Advanced Microelectronics	Various	Various : Various	-	0.000	Feb 2020	9.085	Jan 2021	6.566	Dec 2021	-		6.566	-	-	-
Developmental Flight Test	Various	Various : Various	-	-		0.800	Apr 2021	-		-		-	-	-	-
Rad Hard Non-Volatile Memory	Various	Various : Various	-	-		-		0.500	Apr 2022	-		0.500	-	-	-
Rad Hard Radar	Various	Various : Various	-	-		-		0.250	Jun 2022	-		0.250	-	-	-
Subtotal			-	11.886		18.985		13.316		-		13.316	-	-	N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Air Force											Date: May 2021			
Appropriation/Budget Activity 3600 / 4					R-1 Program Element (Number/Name) PE 0603851F / <i>Intercontinental Ballistic Mis sile - Dem/Val</i>					Project (Number/Name) 641022 / <i>ICBM Reentry Vehicle Applications</i>				

Management Services (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
RVAP Program Management Administration	Various	Various : Various	-	0.654	Jan 2020	0.702	Jan 2021	0.700	Dec 2021	-		0.700	-	-	-
Subtotal			-	0.654		0.702		0.700		-		0.700	-	-	N/A
			Prior Years	FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals			-	17.060		22.337		18.166		-		18.166	-	-	N/A

Remarks
The developmental test flight enables us to demonstrate developing technologies in relevant ICBM environments.

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Exhibit R-4, RDT&E Schedule Profile: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0603851F / <i>Intercontinental Ballistic Mis sile - Dem/Val</i>	Project (Number/Name) 641022 / <i>ICBM Reentry Vehicle Applications</i>

	FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
RVAP																												
RVAP Joint Technology Demonstrator																												
RVAP Flight Materials Test Platform																												
RVAP Modeling and Simulation Programs																												
RVAP Advanced Concept Studies																												
RVAP Aeroshell Studies																												
RVAP Virtual Environment Trainer Launch Facility Prototype Development																												
RVAP Radiation-Hardened Advanced Microelectronics																												
Developmental Test Flight																												
Rad Hard Non-Volatile Memory																												
Rad Hard Radar																												

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Exhibit R-4A, RDT&E Schedule Details: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0603851F / <i>Intercontinental Ballistic Mis sile - Dem/Val</i>	Project (Number/Name) 641022 / <i>ICBM Reentry Vehicle Applications</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
RVAP				
RVAP Joint Technology Demonstrator	2	2020	4	2026
RVAP Flight Materials Test Platform	4	2020	4	2020
RVAP Modeling and Simulation Programs	2	2020	4	2023
RVAP Advanced Concept Studies	1	2020	2	2023
RVAP Aeroshell Studies	1	2020	4	2020
RVAP Virtual Environment Trainer Launch Facility Prototype Development	1	2022	4	2022
RVAP Radiation-Hardened Advanced Microelectronics	2	2020	4	2025
Developmental Test Flight	2	2021	4	2021
Rad Hard Non-Volatile Memory	3	2022	4	2024
Rad Hard Radar	3	2022	4	2026

Note

Developmental Test Flight transitions to LRP in FY22
 Joint Technology Demonstrator and Rad Hard Radar continue past FY26

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 4					R-1 Program Element (Number/Name) PE 0603851F / <i>Intercontinental Ballistic Missile - Dem/Val</i>				Project (Number/Name) 641024 / <i>ICBM Command & Control (C2) Applications</i>			
COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
641024: <i>ICBM Command & Control (C2) Applications</i>	-	3.713	0.000	0.000	0.000	0.000	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Command and Control Applications Program (C2AP) supports ICBM weapon system connectivity to the President and National Command Authorities. C2AP studies and assesses both legacy and future C2 System technology applications. C2AP evaluates and develops assured, survivable, and secure communications and battlespace awareness between the missile Launch Control Centers and Launch Facilities essential for mission execution. Efforts include identifying and developing current and future technologies, as well as concepts that exploit state-of-the-art communications and information transfer techniques to both current and future ICBM systems. Products include studies, demonstrations and tests such as ICBM Weapon System C2 (WSC2) architectures, networks, and systems to meet nuclear command and control requirements.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver weapon system capability. The use of such programs funds would be in addition to the civilian pay expenses budgeted in program element 0605831F. In FY20 \$0M was expended for civilian pay expenses in this program element, and in FY21 \$0M is forecasted for civilian pay expenses in this program element.

B. Accomplishments/Planned Programs (\$ in Millions)

	FY 2020	FY 2021	FY 2022
Title: Command and Control Application Program	3.713	0.000	0.000
Description: Examine and develop concepts for transforming ICBM WSC2 to meet current and future requirements.			
FY 2021 Plans: N/A			
FY 2022 Plans: N/A			
Accomplishments/Planned Programs Subtotals			0.000

C. Other Program Funding Summary (\$ in Millions)

Line Item	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
• RDTE 04 PE 0605230F: <i>GBSD</i>	538.643	1,447.113	2,570.442	-	2,570.442	-	-	-	-	-	-

Remarks

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0603851F / <i>Intercontinental Ballistic Mis sile - Dem/Val</i>	Project (Number/Name) 641024 / <i>ICBM Command & Control (C2) Applications</i>

D. Acquisition Strategy

Studies, analyses, limited engineering, will be accomplished; efforts will be conducted using contracting strategies deemed most appropriate, generally using competitive contracts and/or other obligating documentation considered most appropriate by obligating and performing agencies involved.

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Exhibit R-4, RDT&E Schedule Profile: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0603851F / <i>Intercontinental Ballistic Mis sile - Dem/Val</i>	Project (Number/Name) 641024 / <i>ICBM Command & Control (C2) Applications</i>

FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

C2AP	
C2AP Battlespace Awareness Studies	██████████
C2AP Cyber Technologies	██████████

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Exhibit R-4A, RDT&E Schedule Details: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0603851F / <i>Intercontinental Ballistic Mis sile - Dem/Val</i>	Project (Number/Name) 641024 / <i>ICBM Command & Control (C2) Applications</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
C2AP				
C2AP Battlespace Awareness Studies	1	2020	4	2020
C2AP Cyber Technologies	2	2020	4	2020

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force										Date: May 2021		
Appropriation/Budget Activity 3600 / 4					R-1 Program Element (Number/Name) PE 0603851F / <i>Intercontinental Ballistic Missile - Dem/Val</i>				Project (Number/Name) 644209 / <i>Long Range Planning (LRP)</i>			
COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
644209: <i>Long Range Planning (LRP)</i>	-	3.924	0.000	23.433	0.000	23.433	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Long Range Planning (LRP) effort identifies and analyzes potential modifications to current and future Intercontinental Ballistic Missile (ICBM) Weapon Systems required to meet objectives relative to executing flight tests, long-term sustainment, technology insertion, battle space awareness, employment, force structure and future systems. The studies will focus on system supportability, operability, reliability, innovation and maintainability. Options/concepts generated by these studies are evaluated for feasibility, system impacts, and cost. The LRP supports and conducts testing, and future weapon systems development and deployment. Pre-milestone activities may be conducted for current or future ICBM weapon systems to include entry criteria for milestone activities.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver weapon system capability. The use of such programs funds would be in addition to the civilian pay expenses budgeted in program element 0605831F. In FY20 \$0M was expended for civilian pay expenses in this program element, and in FY21 \$0M is forecasted for civilian pay expenses in this program element.

B. Accomplishments/Planned Programs (\$ in Millions)

	FY 2020	FY 2021	FY 2022
Title: Long Range Planning	3.924	0.000	23.433
Description: Analyze, study and plan current and future ICBM activities to meet requirements for long-term sustainment, technology insertion, employment force structure and future systems.			
Note: This is not a New Start. Funding for developmental test flight activities was included in Project 641021 (Propulsion Applications) and Project 641022 (Reentry Vehicle Applications) in Fiscal Year 2021.			
FY 2021 Plans: N/A			
FY 2022 Plans: •Continue developmental test flight capabilities that were started in Reentry Vehicle Applications and Propulsion Applications.			
FY 2021 to FY 2022 Increase/Decrease Statement: Funds increased due to the ramp up of the developmental test flight efforts.			
Accomplishments/Planned Programs Subtotals	3.924	0.000	23.433

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0603851F / <i>Intercontinental Ballistic Mis sile - Dem/Val</i>	Project (Number/Name) 644209 / <i>Long Range Planning (LRP)</i>

C. Other Program Funding Summary (\$ in Millions)

<u>Line Item</u>	<u>FY 2020</u>	<u>FY 2021</u>	<u>FY 2022</u> <u>Base</u>	<u>FY 2022</u> <u>OCO</u>	<u>FY 2022</u> <u>Total</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>FY 2026</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• RDTE 04 PE 0605230F: <i>GBSD</i>	538.643	1,447.113	2,570.442	-	2,570.442	-	-	-	-	-	-

Remarks

D. Acquisition Strategy

Analysis will be accomplished; efforts will be conducted using contracting strategies deemed most appropriate, generally using competitive contracts and/or other obligating documentation considered most appropriate by obligating and performing agencies involved.

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Exhibit R-4, RDT&E Schedule Profile: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0603851F / <i>Intercontinental Ballistic Missile - Dem/Val</i>	Project (Number/Name) 644209 / <i>Long Range Planning (LRP)</i>

	FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
LRP																												
LRP Radiation-Hardened Advanced Microelectronics																												
Virtual Environment Trainer																												
Developmental Flight Test																												

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Exhibit R-4A, RDT&E Schedule Details: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0603851F / <i>Intercontinental Ballistic Missile - Dem/Val</i>	Project (Number/Name) 644209 / <i>Long Range Planning (LRP)</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
LRP				
LRP Radiation-Hardened Advanced Microelectronics	1	2020	4	2020
Virtual Environment Trainer	1	2021	4	2021
Developmental Flight Test	1	2022	4	2026

Note
Developmental Flight Test started in FY21 in BPACs PAP and RVAP; continues past FY26

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 0603859F / <i>Pollution Prevention - Dem/Val</i>
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COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
Total Program Element	-	2.890	0.000	0.000	0.000	0.000	-	-	-	-	-	-
644852: <i>Pollution Prevention</i>	-	2.890	0.000	0.000	0.000	0.000	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This project funds R&D activities that demonstrate and prototype alternative weapon system manufacturing, remanufacturing, and maintenance materials and processes that reduce or eliminate hazardous chemicals, materials and waste streams through cost-effective programs and practices, while improving energy efficiency and reducing greenhouse gas emissions. Upon proof of the new process or materials, the resulting product can be transitioned to depot maintenance processes, which results in reduced maintenance costs, reduced depot flow time, and increases asset availability. Specifically, funds target pollution prevention technologies that reduce or eliminate chromium, cadmium, and nickel, as well as reduce or eliminate Hazardous Air Pollutants (HAPS), Volatile Organic Compounds (VOCs), and Class I and II Ozone Depleting Substances (ODS), global warmers and biochemical oxygen demand (BOD) and to increase the use of renewable and alternative fuels.

This effort is in Budget Activity 4, Advanced Component Development and Prototypes (ACD&P), because efforts are necessary to evaluate integrated technologies, representative modes or prototype systems in a high fidelity and realistic operating environment.

B. Program Change Summary (\$ in Millions)	<u>FY 2020</u>	<u>FY 2021</u>	<u>FY 2022 Base</u>	<u>FY 2022 OCO</u>	<u>FY 2022 Total</u>
Previous President's Budget	3.000	0.000	0.000	0.000	0.000
Current President's Budget	2.890	0.000	0.000	0.000	0.000
Total Adjustments	-0.110	0.000	0.000	0.000	0.000
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	0.000	0.000			
• Other Adjustments	-0.110	0.000	0.000	0.000	0.000

C. Accomplishments/Planned Programs (\$ in Millions)

	<u>FY 2020</u>	<u>FY 2021</u>	<u>FY 2022 Base</u>	<u>FY 2022 OCO</u>	<u>FY 2022 Total</u>
Title: R&D Activites	2.890	0.000	0.000	0.000	0.000

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force	Date: May 2021
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Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 0603859F / <i>Pollution Prevention - Dem/Val</i>
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C. Accomplishments/Planned Programs (\$ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
<p>Description: R&D activities that demonstrate and prototype alternative weapon system manufacturing, remanufacturing, and maintenance materials and processes that reduce or eliminate hazardous chemicals, materials and waste streams through cost-effective programs and practices, while improving energy efficiency and reducing greenhouse gas emissions.</p> <p>FY 2021 Plans: Program ends in 2020</p> <p>FY 2022 Base Plans: Program ends in 2020</p> <p>FY 2022 OCO Plans: Program ends in 2020</p>					
Accomplishments/Planned Programs Subtotals	2.890	0.000	0.000	0.000	0.000

D. Other Program Funding Summary (\$ in Millions)

N/A

Remarks

E. Acquisition Strategy

Pollution Prevention activities are level of effort and use time and materials support contracts.

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Exhibit R-4, RDT&E Schedule Profile: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0603859F / <i>Pollution Prevention - Dem/Val</i>	Project (Number/Name) 644852 / <i>Pollution Prevention</i>

FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

<i>Pollution Prevention</i>	
Requirements ID	
Potential Alternatives	
Test Plan	
Test Report	
Demonstration	
Final Report	

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Exhibit R-4A, RDT&E Schedule Details: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0603859F / <i>Pollution Prevention - Dem/Val</i>	Project (Number/Name) 644852 / <i>Pollution Prevention</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>Pollution Prevention</i>				
Requirements ID	1	2020	4	2020
Potential Alternatives	1	2020	4	2020
Test Plan	1	2020	4	2020
Test Report	1	2020	4	2020
Demonstration	1	2020	4	2020
Final Report	1	2020	4	2020

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force</i> / BA 4: <i>Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 0604001F / <i>NC3 Advanced Concepts</i>
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COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
Total Program Element	-	0.000	0.000	6.900	0.000	6.900	-	-	-	-	-	-
646020: <i>NC3 Advanced Concepts</i>	-	0.000	0.000	6.900	0.000	6.900	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-	-	-

Note
This program, BA 4, PE 0604001F, project 646020, NC3 Advanced Concepts, is a new start.

NC3 Advanced Concepts previously executed from PE 33131F /BPAC 672832, MEECN System Improvements (MSI), funded in FY19 only.

A. Mission Description and Budget Item Justification

Nuclear Command, Control, and Communications (NC3) Advanced Concepts is required for development and prototyping of next generation NC3 systems and sub-systems. This program ensures a responsive design and development engineering infrastructure to address evolving Nuclear Deterrence Operations (NDO) mission requirements, emerging issues and technology insertion/technology application on the NC3 Weapon System (WS), future strategic systems/capability, and other common strategic areas where appropriate, and develop enhanced multi-use capabilities. The NC3 Advanced Concepts Program will provide technology maturation and risk reduction activities to support the AF NC3 Weapon System (AN/USQ-225). Activity will reduce life cycle costs, inform technology maturation & risk reduction efforts, improve system performance, mitigate evolving threats, and ensure both viability and durability of the AF NC3 Weapon System.

This program element may include necessary emergent or unanticipated civilian pay expenses required to manage, execute, and deliver NC3 Advanced Concepts for emergent or unanticipated weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program element 0605831F.

This effort is in Budget Activity 4, Advanced Component Development and Prototypes (ACD&P), because efforts are necessary to evaluate integrated technologies, representative modes or prototype systems in a high fidelity and realistic operating environment.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force	Date: May 2021
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Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 0604001F / NC3 Advanced Concepts
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B. Program Change Summary (\$ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Previous President's Budget	0.000	0.000	0.000	0.000	0.000
Current President's Budget	0.000	0.000	6.900	0.000	6.900
Total Adjustments	0.000	0.000	6.900	0.000	6.900
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	0.000	0.000			
• Other Adjustments	0.000	0.000	6.900	0.000	6.900

Change Summary Explanation

FY22 BA 4, PE 0604001F, project 646020, NC3 Advanced Concepts, is a new start.

C. Accomplishments/Planned Programs (\$ in Millions)	FY 2020	FY 2021	FY 2022
Title: NC3 Advanced Concepts	0.000	0.000	6.900
Description: NC3 Advanced Concepts activities will include but not limited to; conducting studies, analysis, and prototyping; test bed activities; exercise participation; developing modeling and simulation of identified NC3 WS architecture; integrated NC3 WS testing, validation, and certification; and direct mission support contracts in support of next generation NC3 systems and sub-systems. NC3 Advanced Concepts ensures a responsive design and development engineering infrastructure to address evolving NDO.			
FY 2021 Plans: None			
FY 2022 Plans: NC3 Advanced Concepts will be conducting studies, analysis, and prototyping; test bed activities; exercise participation; developing modeling and simulation of identified NC3 WS architecture; integrated NC3 WS testing, validation, and certification; and direct mission support contracts in support of next generation NC3 systems and sub-systems			
FY 2021 to FY 2022 Increase/Decrease Statement: N/A			
Accomplishments/Planned Programs Subtotals	0.000	0.000	6.900

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force Date: May 2021

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 0604001F / NC3 Advanced Concepts
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D. Other Program Funding Summary (\$ in Millions)

N/A

Remarks

E. Acquisition Strategy

To conduct NC3 Advanced Concepts essential activities a combination of competitively awarded contracts, as well as sole source contracts and other transaction authority, may be used to augment AF organic capabilities with technical skill sets from FFRDCs, research laboratories, UARCs, and industry Advisory and Assistance Services (A&AS) providers. All NC3 Advanced Concepts activities will be evaluated for promising technologies and considered for tech transition into the AF NC3 WS.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0604001F / NC3 Advanced Concepts	Project (Number/Name) 646020 / NC3 Advanced Concepts
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Product Development (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
NC3 Advanced Concepts	TBD	TBD : TBD	-	-		-		6.900	Feb 2022	-		6.900	-	-	-
Subtotal			-	-		-		6.900		-		6.900	-	-	N/A
Project Cost Totals			-	-		0.000		6.900		-		6.900	-	-	N/A

Remarks
NC3 Advanced Concepts

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Exhibit R-4, RDT&E Schedule Profile: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0604001F / <i>NC3 Advanced Concepts</i>	Project (Number/Name) 646020 / <i>NC3 Advanced Concepts</i>
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	FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

<i>NC3 Advanced Concepts</i>	
NC3 Advanced Concepts (Level of Effort)	[REDACTED]

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Exhibit R-4A, RDT&E Schedule Details: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0604001F / <i>NC3 Advanced Concepts</i>	Project (Number/Name) 646020 / <i>NC3 Advanced Concepts</i>
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Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>NC3 Advanced Concepts</i>				
NC3 Advanced Concepts (Level of Effort)	1	2022	4	2023

Note
NC3 Advanced Concepts (Level of Effort)

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 0604002F / <i>Air Force Weather Services Research</i>
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COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
Total Program Element	-	0.747	2.234	0.986	0.000	0.986	-	-	-	-	-	-
643560: <i>AF Weather Services Research</i>	-	0.747	2.234	0.986	0.000	0.986	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-	-	-

A. Mission Description and Budget Item Justification

This budget activity funds the development necessary to evaluate integrated technologies and models for future operationalization into segments of the Air Force Weather Services (AFWS) in support of the 2018 National Defense Strategy's (NDS) three lines of effort. To improve readiness for a more lethal force, AFWS provides timely, accurate, resilient and relevant environmental information, to include space and terrestrial weather, for global battlespace situational awareness for Air Force (AF), Army, Special Operations Forces (SOF), Space Force (USSF), combatant commands, the Intelligence Community (IC), and other government agencies. AFWS capabilities at home station and deployed provide critical environmental intelligence in support of decision makers to gain the asymmetric advantage during the full spectrum of air and space combat operations. AFWS development enhances the lethality, effectiveness, and survivability of AF weapon systems and precision munitions by modernizing capability and seeking the military advantage to accurately predict friendly and foe environmental impacts to optimize mission execution and planning, targeting, weaponeering, battle damage assessment, and space systems operations. To strengthen alliances and partnerships, AFWS development efforts integrate Department of Defense (DoD), government agency, commercial, and international partner environmental data with AFWS information system equipment for processing, storing, exploiting, and disseminating multi-domain weather information for analysis, forecasting, mission integration, and greater interoperability. To ensure greater performance and affordability for the AF, AFWS systems are being modernized through improvements to architecture and system efficiency, cybersecurity, joint all-domain command and control (JADC2) and sensing grid integration, migration to cloud computing, and expanding agile software development practices.

AFWS aligns activities under four capability areas: Weather Data Collection, Weather Data Analysis and Dissemination, Weather Forecasting, and Product Tailoring/Warfighter Applications (PTWA). This alignment ensures an integrated and systems-oriented approach to program management decisions. A portion of the Weather Forecasting capability is addressed by RDT&E, BA 04, PE 0604002F, Project 643560 - Air Force Weather Services Research. By FY 2023, a portion of the APPN 3600 funding and activities from AF PE 0604002F, Project 643560, Air Force Weather Services Research, will be transferred to the USSF PE 1206402SF, Space Force Weather Services Research, in order to align current AF ground-based space sensing projects within the USSF portfolio.

1. Weather Forecasting provides global and regional advanced scientific numerical weather prediction capabilities for automated, high-resolution forecast products for mission planning and execution. Space weather modeling assists in characterizing and forecasting the near-earth environment to the sun and enables space weather anomaly and space weather impact assessments. Weather Forecasting includes activities for Numerical Weather Modeling (NWM) and Space Weather Analysis and Forecast System (SWAFS). SWAFS is a software suite of 47 models and applications to ingest, process, and store space environmental data, run space environmental models to specify and forecast the near-earth environment, and run space effects characterization applications.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 0604002F / <i>Air Force Weather Services Research</i>
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This program element may include necessary civilian pay expenses required to manage, execute, and deliver weapon system capability. The use of such programs funds would be in addition to the civilian pay expenses budgeted in program element 0605831F. In FY20 \$0M was expended for civilian pay expenses in this program element, and in FY21 \$0M is forecasted for civilian pay expenses in this program element.

This effort is in Budget Activity 4, Advanced Component Development and Prototypes (ACD&P), because efforts are necessary to evaluate integrated technologies, representative modes or prototype systems in a high fidelity and realistic operating environment.

B. Program Change Summary (\$ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Previous President's Budget	0.772	0.869	1.000	0.000	1.000
Current President's Budget	0.747	2.234	0.986	0.000	0.986
Total Adjustments	-0.025	1.365	-0.014	0.000	-0.014
• Congressional General Reductions	0.000	-0.004			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	1.369			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	-0.025	0.000			
• SBIR/STTR Transfer	0.000	0.000			
• Other Adjustments	0.000	0.000	-0.014	0.000	-0.014

Congressional Add Details (\$ in Millions, and Includes General Reductions)

Project: 643560: *AF Weather Services Research*

Congressional Add: *Drought Warning System*

	FY 2020	FY 2021
	0.000	1.369
Congressional Add Subtotals for Project: 643560	0.000	1.369
Congressional Add Totals for all Projects	0.000	1.369

Change Summary Explanation

FY20: \$0.025M reprogrammed at end of FY20 to account for actuals.

FY21: \$0.004M reduction due to undistributed congressional general reduction and \$1.369M program increase due to congressional add for Drought Warning System.

C. Accomplishments/Planned Programs (\$ in Millions)	FY 2020	FY 2021	FY 2022
Title: Space Weather Analysis and Forecast (SWAFS) Radiation Exposure (Rad-Ex) Model	0.181	0.000	0.000

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force		Date: May 2021		
Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>		R-1 Program Element (Number/Name) PE 0604002F / <i>Air Force Weather Services Research</i>		
C. Accomplishments/Planned Programs (\$ in Millions)		FY 2020	FY 2021	FY 2022
<p>Description: SWAFS-RadEx Air Force Research Lab (AFRL) Analysis of Alternatives (AoA) and modeling to assess high-flyer radiation exposure.</p> <p>FY 2021 Plans: N/A</p> <p>FY 2022 Plans: N/A</p>				
<p>Title: Space Weather Analysis and Forecast System (SWAFS) magnetospheric Energetic Charged Particle Hazard Assessment (SWAFS-ECP HAS)</p> <p>Description: SWAFS-ECP HAS AFRL AoA and modeling to assess ECP conditions throughout the global space environment to enable decision makers to determine cause of satellite anomaly.</p> <p>FY 2021 Plans:</p> <ul style="list-style-type: none"> - Continue AFRL AoA for existing ECP HAS models with the Space Environment Anomaly Resolution (SpEAR) tool to support Combined Space Operations Center (CSpOC) and Satellite Operations Squadrons (SOPS). - Continue the AFRL AoA upgraded scintillation software. - Collect and exploit new data ingest of space weather observations. - Rapidly respond to implement system resiliency and situational awareness necessary to operate in the contested space domain. - Continue program office and other related support activities that may include, but are not limited to, studies, technical analysis, and prototyping, etc. <p>FY 2022 Plans: N/A</p> <p>FY 2021 to FY 2022 Increase/Decrease Statement: FY 2022 decreased compared to FY 2021. Funding decreased due to the completion of the BA 04 RDT&E portion of this effort, RDT&E for this effort will continue with BA 07 Research, Development, Test, and Evaluation (RDT&E) funding from PE 0305111F.</p>		0.566	0.288	0.000
<p>Title: Space Weather Analysis and Forecast System (SWAFS) Scintillation Nowcast and Forecast Technology (SNFT) software upgrade</p> <p>Description: SWAFS SNFT AFRL AoA to upgrade software allowing use of model algorithms that utilize sensor packages on the Constellation Observing System to monitor Meteorology, Ionosphere, and Climate (COSMIC II) to understand space environment conditions affecting satellites and communications.</p>		-	0.577	0.986

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force	Date: May 2021
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Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 0604002F / <i>Air Force Weather Services Research</i>
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C. Accomplishments/Planned Programs (\$ in Millions)	FY 2020	FY 2021	FY 2022
<p>FY 2021 Plans:</p> <ul style="list-style-type: none"> - Begin AFRL AoA for SNFT software. - Collect and exploit new data ingest of space weather observations. - Continue program office and other related support activities that may include, but are not limited to: studies, technical analysis, risk reduction experiments and prototyping, integration and test of command and control (C2) resiliency measures and mission partner interfaces, space test/combat range events, office support, etc. <p>FY 2022 Plans:</p> <ul style="list-style-type: none"> - Continue the AFRL AoA upgraded scintillation software. - Assess the maturity and readiness of scintillation software for integration into the SWAFS cloud environment. - Develop software prototypes based on the previous development of physics-based algorithms to rapidly respond to implement system resiliency and situational awareness necessary to operate in the contested space domain. <p>FY 2021 to FY 2022 Increase/Decrease Statement: FY 2022 increased compared to FY 2021. Funding increased due to increased priority of SNFT work for BA 04 RDT&E funding and increased software development prototyping effort, which is largely focused on the development of the foundational physics algorithms.</p>			
Accomplishments/Planned Programs Subtotals	0.747	0.865	0.986

	FY 2020	FY 2021
<p>Congressional Add: Drought Warning System</p> <p>FY 2020 Accomplishments: N/A</p> <p>FY 2021 Plans: - Review all new Broad Agency Announcement (BAA) white papers and request proposals. - Award 1 to 2 new contracts from new BAA, subject to change based on number of white paper submissions - and will look for efforts that will help to build upon previous AF Weather Service drought research efforts. - Research & prototype development will center on global drought research warning and mitigation, with emphasis/applications on extreme weather event forecasting, drought climate studies and regional destabilization analysis, effects to strategic basing and DoD installation environmental resiliency, and possible efforts for flood mitigation.</p>	0.000	1.369
Congressional Adds Subtotals	0.000	1.369

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 0604002F / <i>Air Force Weather Services Research</i>
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D. Other Program Funding Summary (\$ in Millions)

<u>Line Item</u>	<u>FY 2020</u>	<u>FY 2021</u>	<u>FY 2022</u> <u>Base</u>	<u>FY 2022</u> <u>OCO</u>	<u>FY 2022</u> <u>Total</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>FY 2026</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• RDTE 07 0305111F: <i>WEATHER SERVICE</i>	2.357	4.099	4.362	-	4.362	-	-	-	-	-	-

Remarks

0305111F BPAC 672738 3600 funds on Air Force PE located in IDECS.

E. Acquisition Strategy

SWAFS will use individual Federal Acquisition Regulation (FAR) based and rapid acquisition contracting methods, as well as AFRL for development works (Technology Readiness Level (TRL) 6 and below) to develop AoA, design solutions, and prototype code.

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Exhibit R-4, RDT&E Schedule Profile: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0604002F / Air Force Weather Services Research	Project (Number/Name) 643560 / AF Weather Services Research

FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

SWAFS-RadEx	
SWAFS-RadEx Analysis of Alternatives	
SWAFS-ECP HAS	
SWAFS-ECP HAS Analysis of Alternatives	
Scintillation Nowcast	
Forecast Model Update Analysis of Alternatives	
Solar Wind	
Solar Wind Model Analysis of Alternatives	

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Exhibit R-4A, RDT&E Schedule Details: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0604002F / <i>Air Force Weather Services Research</i>	Project (Number/Name) 643560 / <i>AF Weather Services Research</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
SWAFS-RadEx				
SWAFS-RadEx Analysis of Alternatives	1	2020	4	2020
SWAFS-ECP HAS				
SWAFS-ECP HAS Analysis of Alternatives	1	2020	2	2021
Scintillation Nowcast				
Forecast Model Update Analysis of Alternatives	1	2021	4	2022
Solar Wind				
Solar Wind Model Analysis of Alternatives	1	2023	4	2026

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 0604003F / <i>Advanced Battle Management System (ABMS)</i>
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COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
Total Program Element	-	139.203	158.492	203.849	0.000	203.849	-	-	-	-	-	-
640141: <i>Advanced Battle Management System (ABMS)</i>	-	139.203	158.492	203.849	0.000	203.849	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-	-	-

A. Mission Description and Budget Item Justification

ABMS is the top modernization priority for the Department of the Air Force (DAF) and its primary contribution to provide decision superiority and meet the Joint All-Domain Command and Control (JADC2) requirements. JADC2 requires that individual military activities not simply be deconflicted, but be integrated - activities in one domain must enhance the effectiveness of those in other domains and compensate for vulnerabilities. ABMS will connect sensors, systems, and weapons across both the U.S. Space Force and U.S. Air Force. ABMS is not a platform or sensor, but instead will be the essential data network that connects and empowers current and future platforms to fight and win in the modern era as defined by the National Defense Strategy and Joint All-Domain Operations Department of Defense directives. Legacy and future sensors from a variety of programs and sources produce data that needs to be made available to those people and systems that need it most. Multi-level secure processing occurs on global distributed clouds, tactical edge nodes, infrastructure, platforms, and end user devices where operators interface with the data and applications at the required classification level. For information to flow, the network must be enabled by a combination of government and commercial connectivity pathways to move data to and through a suite of cloud and local edge-based applications that make sense of the environment and apply advanced algorithms aided by artificial intelligence and machine learning. Strategic, operational, and tactical operators use these applications to manage and direct the desired effects using machine-to-machine connections.

On 24 Nov 2020, the DAF Rapid Capabilities Office (DAF RCO) became the ABMS Integrating Program Executive Office (PEO) in a deliberate transition to start acquiring enduring ABMS capability through focused acquisition efforts and investments in robust digital infrastructure. The DAF RCO will build on the DAF Chief Architect Office (CAO) efforts to mature technology across product lines previously identified as Open, Networked, Extendible (ONEs) and through Onramp demonstration activities. The DAF RCO will build the digital infrastructure and work in tight partnership across the DAF acquisition community to ensure DAF systems have seamless interoperability and compatibility to meet the JADC2 operational requirements.

ABMS, as an acquisition effort managed by the DAF RCO, will pursue two parallel, symbiotic investment strategies under PE 0604003F: enduring digital infrastructure investments and Capability Releases (CRs) focused on closing kill-chains and delivering immediate operational capability to the warfighter. Instead of continuing to proliferate ONEs, DAF RCO will focus ABMS investments on six capabilities as part of digital infrastructure and CRs:

1. Secure Processing: The hardware and software for processing and storage through multi-level security globally and edge enabling a full range of military operations.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 0604003F / <i>Advanced Battle Management System (ABMS)</i>	
<p>2. Connectivity: Maturation and integration of open software-defined radios and networks, government-owned waveform libraries, and wideband multi-function RF systems. This element also includes the integration and standards required to leverage advances in commercial technology such as Open Communications Standards (OCS), 5G networks, and connections through multi-orbit satellite communications.</p> <p>3. Data Management: Cloud-based data libraries, data feeds, data wrappers, software-defined data management, and content routing to improve data discoverability and information sharing across the joint force for legacy and future platforms and programs.</p> <p>4. Applications: Cloud-based applications to provide User Interface/User Experience (UI/UX) capabilities that will position warfighters "on the loop" to provide robust and dynamic battle management, command and control (BMC2) functionality, improved timing, and enhanced decision advantage.</p> <p>5. Sensor Integration: ABMS will develop government-owned standards and provide open and reusable capabilities, to ensure interoperability with the ABMS digital infrastructure for existing and future military systems.</p> <p>6. Effects Integration: ABMS will develop government-owned standards to ensure the successful integration of DAF and Joint effects capabilities into the ABMS digital infrastructure for existing and future military systems.</p> <p>Capability Release #1 (Airborne Edge Node): Leveraging the enduring digital infrastructure investments in Secure Processing, Connectivity, and Data Management, ABMS Capability Release #1 will deliver to the warfighter the first, secure tactical edge node — leveraging government reference architecture solutions connecting 5th Gen Tactical Air fighter platforms through a KC-46 tanker to operational C2 nodes. This "Airborne Edge Node" will allow for secure, resilient communications between the F-22 and F-35 and will extend the sharing of situational awareness across the globe in near-real time through satellite communications to and from command and control nodes such as Air Operations Centers (AOC) and Common Mission Control Center (CMCC). In addition to serving the tactical customers (fighter aircraft), the KC-46 C2 node will also provide data and information to operational and strategic customers while providing improved strategic awareness to the KC-46 crew. CR#1 constitutes a first edge node on the ABMS network and provides the example for other platforms to connect.</p> <p>ABMS funding provides for program management support, operational concept development and demonstration, hardware development and integration, and software development and integration. The funding will also enable the limited transition of mature and ready capabilities to appropriate programs of record in synchronization with planned modernization activities.</p> <p>Previous categories of Digital Architecture, Standards, and Concepts and Architecture Experimentation and Evaluation cut across all Department of the Air Force programs and are not exclusive to a single program. Starting in FY22 those activities are re-aligned to a Department-wide budget independent of ABMS, PE 0604006F.</p> <p>This program element may include necessary civilian pay and National Guard/Reserve Duty expenses required to manage, execute, and deliver ABMS capability. This program element may include necessary civilian pay expenses required to manage, execute, and deliver weapon system capability. The use of such programs funds would be in addition to the civilian pay expenses budgeted in program element 0605831F. In FY20 3.770M and in FY21 0.900M was expended for civilian pay expenses in this program element.</p>		

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 0604003F / <i>Advanced Battle Management System (ABMS)</i>
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This effort is in Budget Activity 4, Advanced Component Development and Prototypes (ACD&P), because efforts are necessary to evaluate integrated technologies, representative modes or prototype systems in a high fidelity and realistic operating environment.

B. Program Change Summary (\$ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Previous President's Budget	8.000	302.323	449.290	0.000	449.290
Current President's Budget	139.203	158.492	203.849	0.000	203.849
Total Adjustments	131.203	-143.831	-245.441	0.000	-245.441
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	-143.831			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	131.496	0.000			
• SBIR/STTR Transfer	-0.293	0.000			
• Other Adjustments	0.000	0.000	-245.441	0.000	-245.441

Change Summary Explanation

FY 2020: Above Threshold Reprogramming realigned 131.496M into PE 0604003F, Advanced Battle Management System (ABMS), Project 640141, ABMS, for greater transparency, tracking, and execution purposes. OSD approved Internal Reprogramming action (DOD Serial No: FY 20-25 IR) action reprogrammed 34.308M from PE 0604003F, Advanced Battle Management System (ABMS), Project 67411L, Advanced Battle Management System, and 97.188M from PE 0304115F, Multi Domain Command and Control (MDC2), Project 673380, MDC2. SBIR/STTR Transfer of 0.293M as of Sep 2020.

FY 2021: Program reduced -143.831M in total due to unjustified growth (-50.000M) poor justification materials (-15.000M), excess to need (-0.290M) and forward financing of digital architecture, sensor integration, data, secure processing , connectivity, applications, effects integrations and onramps (-78.541M).

FY 2022: Program reduced 245.441M to better reflect amounts appropriate for FY 2022 objectives.

C. Accomplishments/Planned Programs (\$ in Millions)	FY 2020	FY 2021	FY 2022
Title: Digital Infrastructure	0.000	43.922	57.203
Description: The first three ABMS capabilities (secure processing, connectivity, and data management) are considered the core digital infrastructure and the emphasis of future investments to ensure the ability to connect the joint force and allow decision making superiority at the tactical, operational, and strategic levels faster than the adversary.			

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force	Date: May 2021
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Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force</i> / BA 4: <i>Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 0604003F / <i>Advanced Battle Management System (ABMS)</i>
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C. Accomplishments/Planned Programs (\$ in Millions)

	FY 2020	FY 2021	FY 2022
<p>Secure Processing: Represents the physical infrastructure DAF RCO intends to procure in the initial phase. Investments focus on hybrid commercial and tactical edge multi-level security, multi-cloud environments resulting in secure compute and storage capability. Solutions will provide tactical edge secure processing environments and tools enabling remote operations as well as 'on the move' when disconnected from the broader network and global environment. These secure processing solutions will host critical services such as robust data management solutions, zero-trust multi-level security applications, Artificial Intelligence (AI) algorithms and Machine Learning (ML) capabilities.</p> <p>Connectivity: Delivers capabilities to enable resilient, robust communications and the transport of data globally, to the edge, and through space. This will include the software-defined networking and routing layer to enable content routing across connected nodes through government as well as commercial communication paths. ABMS will integrate into existing and future connectivity solution efforts in order to bridge gaps across existing and future platforms. ABMS will leverage Open Communications Standard (OCS) software-defined radios for integration onto platforms, enabling competitive rapid upgrading and the addition of new waveforms over time. Leveraging OCS for legacy and non-native platforms will allow communication through translation and relay. The software-defined radio solution intended for Capability Release #1 builds on OCS technology in partnership with other PEOs across the DAF. Lastly, ABMS will leverage the rapidly advancing commercial satellite ecosystem to ensure robust and resilient connectivity for the Joint Force.</p> <p>Data Management: Technologies and solutions will expose data through widely used commercial best practices and techniques such as Application Program Interfaces (APIs), and standardized data fabric solutions. This capability includes the capability for machine-assisted tagging of data across the DAF to enable rapid exploitation and processing. These techniques enable data to rapidly and securely move across multiple security levels and support decision making. Other high priority data management solutions include critical investments in zero-trust multi-level security applications, Artificial Intelligence (AI) applications, and Machine Learning (ML) capabilities.</p> <p>FY 2021 Plans:</p> <ul style="list-style-type: none"> • Deploy OCONUS cloud prototype(s) and conduct demonstrations to store and transfer data between clouds, operate with and without cloud connectivity, move existing applications into the clouds, and develop security solutions. • Conduct technical analysis and prototyping for data management, including data tagging, data hosting and metadata. <p>FY 2022 Plans:</p> <ul style="list-style-type: none"> • Continue maturing CONUS and OCONUS clouds by adding more data types, data transfers across classification levels, establishing data and network management standards and tools, and developing and hosting cloud-native applications. • Mature connections between CONUS, OCONUS, and existing clouds. 			

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force		Date: May 2021		
Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>		R-1 Program Element (Number/Name) PE 0604003F / <i>Advanced Battle Management System (ABMS)</i>		
C. Accomplishments/Planned Programs (\$ in Millions)		FY 2020	FY 2021	FY 2022
<ul style="list-style-type: none"> • Begin data architecture, data tagging and data orchestration design solutions and prototypes that enable available data to be exposed, processed and transferred amongst multi-level security ABMS cloud environments. <p>FY 2021 to FY 2022 Increase/Decrease Statement: FY21 Congressional Marks</p>				
<p>Title: Capability Releases</p> <p>Description: Capability Releases (CRs) deliver operational capability by leveraging and/or supplementing digital infrastructure investments, while making targeted investments in the remaining three ABMS capabilities of Applications, Sensor Integration, and Effects Integration areas.</p> <p>Title: Capability Release #1 (Airborne Edge Node) Description: Based off of CSAF and CSO requirements and technical maturity, CR #1 will focus on the Edge Network to enable sharing of information across 5th Gen Tac Air and provide situational awareness to KC-46 and C2 nodes, enabling better operational decisions to deliver effects faster than the adversary is able to respond. This initial node will inform future platform integration and proliferation to establish the edge network.</p> <p>Title: Cloud-based C2 in support of NORAD/NORTHCOM Description: Investment in cloud-based C2 specifically in support of N/NC requirements with some investments in Applications, Sensor Integration, and Effects Integration.</p> <p>FY 2021 Plans:</p> <ul style="list-style-type: none"> • Capability Release #1 (Airborne Edge Node): - Continue development of open architecture, non-vendor locked, Radio and Aperture hardware and software that provides connectivity to current and future networks for C2 communications. - Prototype Radio and Apertures and conduct laboratory and testbed risk-reduction activities - Initiate design of pod and pylon sets for integration on the KC-46 outer wing stations - Initiate pod, radio and aperture integration design activities. - Initiate development of an Edge Node and Situational Awareness tool for KC-46 integration - Conduct test planning and preparations <p>FY 2022 Plans:</p>		0.000	68.406	146.646

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force		Date: May 2021		
Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>		R-1 Program Element (Number/Name) PE 0604003F / <i>Advanced Battle Management System (ABMS)</i>		
C. Accomplishments/Planned Programs (\$ in Millions)		FY 2020	FY 2021	FY 2022
<ul style="list-style-type: none"> • Capability Release #1 (Airborne Edge Node) <ul style="list-style-type: none"> - Complete open architecture radio, aperture, pod/pylon, edge node and Situational Awareness (SA) tool designs - Develop Applications that will provide Sensor and Effects Integration capabilities through the SA tool - Complete builds of completed designs for integration onto the KC-46 - Install podded system and SA Tool onto KC-46 and initiate test activities - Begin build of additional podded systems to meet approved quantity requirements - Develop Technical Data Package to enable potential follow-on development and/or procurement activities • Cloud-based C2 in support of N/NC: <ul style="list-style-type: none"> - Initiate design activities focused on developing a scalable and extensible data-cloud architecture that leverages artificial intelligence/machine learning (AI/ML) applications and produces a common operating picture. - Develop shared visualization of multiple sources: automated & fused 2D/3D representation of air domain - Ingest, fuse, and analyze data from military, government, and commercial sources to multi-classification cloud environments unlimited by compute & store - Develop automated and operator-selectable tasking of assets, voice, data and C2 <p>FY 2021 to FY 2022 Increase/Decrease Statement: The increase is due to planned program execution schedule.</p>				
<p>Title: Digital Architecture, Standards, and Concepts</p> <p>Description: This line of effort develops and continually advances the integrated U.S. Air Force and U.S. Space Force digital architecture in order to enable current and future platforms and systems to operate as an ecosystem, or family of capabilities, in concert with the other Services, the Intelligence Community, and our allies and partners - as one joint and combined team. Open architectures coupled with open standards and a digital engineering ecosystem is critical to all Department of the Air Force programs because they provide the foundation for agility and adaptability over time as well as enabling the modular approach to development and integration across a family of systems. This activity also evaluates the technical and operational feasibility of new technical concepts that may be brought into the architecture through the science, technology, research, and development and experimentation enterprise. Finally, this effort creates and manages the family-of-systems trade space lying between traditional requirements and acquisition roles, turning warfighter requirements into potential integrated architecture level designs "horizontally" across all Program Executive Office "vertically" managed portfolios.</p> <p>FY 2021 Plans:</p> <ul style="list-style-type: none"> • Complete digital engineering development environment in the cloud and Platform One. • Complete incorporation of initial platform level system representation. • Identify open standard limitations. 		118.612	15.374	0.000

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force		Date: May 2021		
Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>		R-1 Program Element (Number/Name) PE 0604003F / <i>Advanced Battle Management System (ABMS)</i>		
C. Accomplishments/Planned Programs (\$ in Millions)		FY 2020	FY 2021	FY 2022
<ul style="list-style-type: none"> Conduct analysis of U.S. Air Force and U.S. Space Force architectures. <p>FY 2022 Plans:</p> <ul style="list-style-type: none"> N/A <p>FY 2021 to FY 2022 Increase/Decrease Statement: FY 2022 funding decreased compared to FY 2021 by 15.374M. Funding decreased to realign resources within Department of the Air Force to provide better visibility into funding to support ABMS versus other open architecture efforts. Starting in FY 2022 these activities are realigned to PE 0604006F.</p>				
<p>Title: Architecture Experimentation and Evaluation</p> <p>Description: Department of Defense needs an agile approach to capability development, integration, and delivery that is both rapid and continuous. Therefore, the program also develops the digital architecture for the Air Force and Space Force via regularly recurring Department of the Air Force Architecture Demonstration and Evaluation events alongside other Services in partnership with one or more operational Commanders. This engine of architecture demonstration and integration affords the opportunity for commanders and operators to shape Minimum Viable capabilities and requirements for operational use. These evaluations and warfighter feedback shape subsequent Department of the Air Force wide architecture activities. The necessity to conduct test and analysis at the architecture level and the speed required by the operational needs require enhanced approaches to traditional test and analysis capabilities, namely new, innovative and sufficiently resourced test and analysis infrastructure, networks, and core subject matter expertise to include employment of military, civilian, reserve, and contractor capabilities.</p> <p>FY 2021 Plans: Conduct two Department of the Air Force Architecture Demonstration and Evaluation events.</p> <p>FY 2022 Plans: N/A</p> <p>FY 2021 to FY 2022 Increase/Decrease Statement: FY 2022 funding decreased compared to FY 2021 by 30.790M. Funding decreased to realign resources with objectives since this line of effort demonstrates and evaluates many different capabilities and architectures rather than within a single program. Starting in FY 2022 these activities are realigned to PE 0604006F.</p>		20.591	30.790	0.000
Accomplishments/Planned Programs Subtotals		139.203	158.492	203.849
D. Other Program Funding Summary (\$ in Millions)				
N/A				

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force Date: May 2021

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 0604003F / <i>Advanced Battle Management System (ABMS)</i>
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D. Other Program Funding Summary (\$ in Millions)

Remarks

E. Acquisition Strategy

ABMS will build to a portfolio of acquisition efforts and should not be viewed as a monolithic program. The first acquisition effort is an ACAT III, Capability Release #1 (CR #1). The Department of the Air Force Rapid Capabilities Office (DAF RCO) matured the CR #1 (Airborne Edge Node) Acquisition Strategy and will be briefing the Service Acquisition Executive (SAE) in 3QFY21.

The ABMS agile acquisition strategy and development approach is modeled after the path of commercial innovation and internet of things technology practices. The acquisition strategy breaks capabilities - that might traditionally be developed as a monolith in the government - up into modular components and then integrates them through open standards and an open architecture. Modularity and openness enable increased competition and continuous innovation, as well as more rapid upgrade of product capabilities. Software development and hardware development can both follow this path—a proven, successful model that is employed in the commercial world as well as in agile government entities.

The iterative nature of technology and speed of technical obsolescence in the 21st century digital age mandate an agile approach to capability development, integration, and delivery that is both rapid and continuous. The DAF RCO will make targeted investments in select areas and technologies to expedite the delivery of warfighter capability and close operational gaps.

To enable the speed and agility required by this acquisition strategy, the ABMS acquisition efforts have developed a contracting strategy that is agile. Though the program employs the full range of contracting authorities, ABMS has established the following three primary Broad Agency Announcements: (1) JADC2 Multi-Award, Multi-Level Security (MA-MLS) Indefinite Delivery/Indefinite Quantity (ID/IQ) vehicle; (2) Open Call, and (3) a Cooperative Research and Development Agreement (CRADA); and (4) already existing contract vehicles where ABMS acquisition efforts are within scope. More information about these calls may be found on <https://beta.sam.gov>.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0604003F / <i>Advanced Battle Management System (ABMS)</i>	Project (Number/Name) 640141 / <i>Advanced Battle Management System (ABMS)</i>
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Product Development (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
DAF RCO - Digital Infrastructure	Various	DAF RCO : Various	-	-		43.922	Oct 2020	57.203	Apr 2022	-		57.203	-	-	-
DAF RCO - Capability Releases	Various	DAF RCO : Various	-	-		68.406	Nov 2020	146.646	Apr 2022	-		146.646	-	-	-
Digital Architectures, Standards, and Concept Development	Various	CAO - Product Line Owners : Various	-	7.506	May 2020	15.374	Oct 2020	-		-		-	-	-	-
Sensor Integration	Various	CAO - Product Line Owners : Various	-	8.808	Jun 2020	-		-		-		-	-	-	-
Multi-Domain Command Data Management	Various	CAO -Product Line Owners : Various	-	9.676	Jul 2020	-		-		-		-	-	-	-
Multi-Domain Secure Processing	Various	CAO - Product Line Owners : Various	-	17.921	Jun 2020	-		-		-		-	-	-	-
Multi-Domain Connectivity	Various	CAO - Product Line Owners : Various	-	25.246	Jun 2020	-		-		-		-	-	-	-
Multi-domain Applications	Various	CAO - Product Line Owners : Various	-	48.455	May 2020	-		-		-		-	-	-	-
Effects Integration	Various	CAO -Product Line Owners : Various	-	1.000	Oct 2020	-		-		-		-	-	-	-
Subtotal			-	118.612		127.702		203.849		-		203.849	-	-	N/A

Test and Evaluation (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
DAF Architecture Experimentation & Evaluation	Various	Product Line Product Owners : Various	-	20.591	May 2020	30.790	Oct 2020	-		-		-	-	-	-
Subtotal			-	20.591		30.790		-		-		-	-	-	N/A

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Exhibit R-4, RDT&E Schedule Profile: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0604003F / <i>Advanced Battle Management System (ABMS)</i>	Project (Number/Name) 640141 / <i>Advanced Battle Management System (ABMS)</i>

	FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

ABMS																												
Digital Architecture, Standards, and Concepts (CAO)																												
Digital Infrastructure (DAF RCO)																												
Capability Releases (DAF RCO)																												
FY21 Milestones																												
FY21 Experimentation & Evaluation #4																												
FY21 Experimentation & Evaluation #5																												

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Exhibit R-4A, RDT&E Schedule Details: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0604003F / <i>Advanced Battle Management System (ABMS)</i>	Project (Number/Name) 640141 / <i>Advanced Battle Management System (ABMS)</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
ABMS				
Digital Architecture, Standards, and Concepts (CAO)	2	2020	4	2021
Digital Infrastructure (DAF RCO)	3	2020	4	2026
Capability Releases (DAF RCO)	4	2021	4	2026
FY21 Milestones				
FY21 Experimentation & Evaluation #4	2	2021	2	2021
FY21 Experimentation & Evaluation #5	3	2021	4	2021

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity					R-1 Program Element (Number/Name)							
3600: <i>Research, Development, Test & Evaluation, Air Force I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>					PE 0604004F / <i>Advanced Engine Development</i>							
COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
Total Program Element	-	647.850	665.280	123.712	0.000	123.712	-	-	-	-	-	-
643608: <i>Advanced Engine Dev</i>	-	647.850	665.280	123.712	0.000	123.712	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Advanced Engine Development Program enables demonstration of advanced turbine engine prototypes. This program is maturing fuel efficient adaptive engine component technologies and reducing associated risk in preparation for next-generation propulsion system development for combat aircraft applications. Adaptive engine technology enables next generation combat aircraft capabilities by combining the efficiency of high bypass turbofans used by commercial airlines with the performance demanded of military fighter engines. This technology has undergone initial development under the auspices of the Air Force Research Laboratory through the Adaptive Versatile Engine Technology (ADVENT) and Adaptive Engine Technology Demonstrator (AETD) programs.

This program element may include necessary emergent or unanticipated civilian pay expenses required to manage, execute, and deliver Advanced Engine Development for emergent or unanticipated weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program element 0605831F. In FY20 \$2.578M expended and in FY21 \$3.141M is estimated for civilian pay expenses in this program element.

This effort is in Budget Activity 4, Advanced Component Development and Prototypes (ACD&P), because efforts are necessary to evaluate integrated technologies, representative modes or prototype systems in a high fidelity and realistic operating environment.

B. Program Change Summary (\$ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Previous President's Budget	671.442	636.495	111.830	0.000	111.830
Current President's Budget	647.850	665.280	123.712	0.000	123.712
Total Adjustments	-23.592	28.785	11.882	0.000	11.882
• Congressional General Reductions	0.000	-1.215			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	30.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	-23.592	0.000			
• Other Adjustments	0.000	0.000	11.882	0.000	11.882

Change Summary Explanation

FY 2020 SBIR/STTR Transfer

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force		Date: May 2021		
Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>		R-1 Program Element (Number/Name) PE 0604004F / <i>Advanced Engine Development</i>		
FY 2021 Congressional Add for Program Increase FY 2021 Congressional General Reductions				
C. Accomplishments/Planned Programs (\$ in Millions)		FY 2020	FY 2021	FY 2022
<p>Title: Adaptive Engine Transition Program</p> <p>Description: The Adaptive Engine Transition Program (AETP) will design and manufacture multiple flight-weight adaptive engine prototypes, complete component rig assessments, characterize materials, and inform manufacturing process improvements. The program will demonstrate adaptive engine technology can be scaled to meet military fighter engine size requirements, while ensuring appropriate manufacturing and technology readiness levels by producing flight-weight prototypes. The prototype engines will demonstrate fuel efficiency increases, thrust increases, and new component technologies by performing sea-level, altitude, and durability assessments across multiple power settings. These assessments will provide data to quantify the capability and reduce risk in areas such as thermal capacity, reliability, and supportability, among others.</p> <p>The FY 2022 Budget Justification Exhibit includes a breakout of the FY 2020 through FY 2022 Next Generation Adaptive Propulsion (NGAP) funds from the AETP effort to increase transparency to Congress.</p> <p>FY 2021 Plans: Complete component rig activities. Complete technology, affordability, and sustainability studies. Complete prototype engine fabrication and conduct engine assessments. Continue airframe integration/adaptive propulsion design efforts. More details can be provided in an appropriate forum.</p> <p>FY 2022 Plans: Funds prototype engine assessments and airframe integration/adaptive propulsion design efforts.</p> <p>FY 2021 to FY 2022 Increase/Decrease Statement: FY 2022 decreased compared to FY 2021 by 200.755 million. Decrease in funding reflective of engine assessments being the last phase of the prototyping effort.</p>		526.956	214.291	13.536
<p>Title: Next Generation Adaptive Propulsion</p> <p>Description: The Next Generation Adaptive Propulsion (NGAP) effort will design and perform component risk reduction for flight-weight adaptive engine prototypes for Next Generation Air Dominance (NGAD) capabilities. NGAP will demonstrate that adaptive engine technology can be scaled to meet Next Generation Air Dominance (NGAD) engine size requirements while ensuring appropriate manufacturing and technology readiness levels.</p> <p>The FY 2022 Budget Justification Exhibit includes a breakout of the FY 2020 through FY 2022 Next Generation Adaptive Propulsion (NGAP) funds from the AETP effort to increase transparency to Congress.</p>		120.894	450.989	110.176

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force		Date: May 2021		
Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>		R-1 Program Element (Number/Name) PE 0604004F / <i>Advanced Engine Development</i>		
C. Accomplishments/Planned Programs (\$ in Millions)		FY 2020	FY 2021	FY 2022
<p>FY 2021 Plans: Complete adaptive engine initial design activities and initiate preliminary design activities for Next Generation Air Dominance (NGAD) capabilities. More details can be provided in an appropriate forum.</p> <p>FY 2022 Plans: Continue adaptive engine preliminary design activities, and initiate prototyping activities for Next Generation Air Dominance (NGAD) capabilities. More details can be provided in an appropriate forum.</p> <p>FY 2021 to FY 2022 Increase/Decrease Statement: FY 2022 decreased compared to FY 2021 by 340.813 million. Funding decreased to a single vendor strategy for NGAP prototyping. More details can be provided in an appropriate forum.</p>				
Accomplishments/Planned Programs Subtotals		647.850	665.280	123.712
D. Other Program Funding Summary (\$ in Millions)				
N/A				
Remarks				
E. Acquisition Strategy				
<p>For the Adaptive Engine Transition Program, the Air Force awarded two limited source, cost plus incentive fee contracts back in 2016 to General Electric and Pratt & Whitney due to their unique qualifications to design a high performance, flight-weight adaptive turbine engine in the thrust class for AETP. Incentive categories include engine weight, performance factors, and maintainability and supportability, with specific metrics for each category incentivized. Embedded in each AETP contract was an option for the Next Generation Adaptive Propulsion (NGAP) effort. In 2018, these options were exercised and awarded to optimize risk reduction for Next Generation Air Dominance (NGAD) capabilities through the NGAP effort. The government agency responsible for managing this program is the Air Force Life Cycle Management Center, Propulsion Directorate, Wright-Patterson Air Force Base, Ohio.</p>				

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0604004F / <i>Advanced Engine Development</i>	Project (Number/Name) 643608 / <i>Advanced Engine Development</i>
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Product Development (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Adaptive Engine Transition Program - GE	C/CPIF	GE : Evendale, OH	-	234.946	Oct 2019	89.574	Oct 2020	5.811		-		5.811	-	-	-
Adaptive Engine Transition Program - PW	C/CPIF	PW : East Hartford, CT	-	287.858	Oct 2019	121.970	Oct 2020	5.811		-		5.811	-	-	-
Next Generation Adaptive Propulsion (Preliminary Design) - GE	C/CPIF	GE : Evendale, OH	-	56.896	Oct 2019	220.494	Oct 2020	-		-		-	-	-	-
Next Generation Adaptive Propulsion (Preliminary Design) - PW	C/CPIF	PW : East Hartford, CT	-	60.268	Oct 2019	224.607	Oct 2020	-		-		-	-	-	-
Next Generation Adaptive Propulsion (Detailed Design & Prototyping) - TBD	C/TBD	TBD : TBD	-	-		-		108.262	Apr 2022	-		108.262	-	-	-
Subtotal			-	639.968		656.645		119.884		-		119.884	-	-	N/A

Management Services (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Adaptive Engine Transition Program - Program Management Support	Various	Various : TBD	-	5.441	Dec 2019	4.317	Dec 2020	1.914	Dec 2021	-		1.914	-	-	-
Next Generation Adaptive Propulsion - Program Management Support	Various	Various : TBD	-	2.441	Dec 2019	4.318	Dec 2020	1.914	Dec 2021	-		1.914	-	-	-
Subtotal			-	7.882		8.635		3.828		-		3.828	-	-	N/A

	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	-	647.850	665.280	123.712	-	123.712	-	-	N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Air Force							Date: May 2021		
Appropriation/Budget Activity 3600 / 4			R-1 Program Element (Number/Name) PE 0604004F / <i>Advanced Engine Developm ent</i>			Project (Number/Name) 643608 / <i>Advanced Engine Dev</i>			
	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract

Remarks
 The FY 2022 Budget Justification Exhibit includes a breakout of the FY 2020 through FY 2022 Next Generation Adaptive Propulsion (NGAP) funds from the AETP effort to increase transparency to Congress.

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Exhibit R-4, RDT&E Schedule Profile: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0604004F / <i>Advanced Engine Developm ent</i>	Project (Number/Name) 643608 / <i>Advanced Engine Dev</i>

FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

<i>Adaptive Engine Transition Program</i>	
Detailed Design, Engine Fabrication, Engine Assessments	
<i>Next Generation Adaptive Propulsion</i>	
Initial Design, Preliminary Design	
Adaptive Prototyping Plan, Detailed Design, Engine Fabrication, Engine Assessments	

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Exhibit R-4A, RDT&E Schedule Details: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0604004F / <i>Advanced Engine Development</i>	Project (Number/Name) 643608 / <i>Advanced Engine Dev</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>Adaptive Engine Transition Program</i>				
Detailed Design, Engine Fabrication, Engine Assessments	1	2020	4	2022
<i>Next Generation Adaptive Propulsion</i>				
Initial Design, Preliminary Design	1	2020	2	2023
Adaptive Prototyping Plan, Detailed Design, Engine Fabrication, Engine Assessments	3	2022	4	2026

Note

The FY 2022 Budget Justification Exhibit includes a breakout of the FY 2020 through FY 2022 Next Generation Adaptive Propulsion (NGAP) funds from the AETP effort to increase transparency to Congress.

The Adaptive Engine Transition Program consists of three phases: detailed design, engine fabrication, and engine assessments.

Program deliverables include: military adaptive engine detailed design parameters and models; multiple engine sets of hardware (plus spare parts); matured technologies; major rig assessment data (controls, combustor, etc.); program reviews; and technology, affordability and sustainability studies.

The Next Generation Adaptive Propulsion effort consists of six phases initial design, preliminary design, adaptive prototyping planning, detailed design, engine fabrication, and engine assessments that will continue into 2027.

Program deliverables include: military adaptive engine detailed design parameters and models; engine hardware (plus spare parts); matured technologies; major rig assessment data (controls, combustor, etc.); program reviews; and technology, affordability and sustainability studies for Next Generation Air Dominance (NGAD) capabilities.

Additional details can be provided in the appropriate forum.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 0604006F / <i>Department of the Air Force Technical Architecture Design, Integration, and Evaluation</i>
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COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
Total Program Element	-	0.000	0.000	82.438	0.000	82.438	-	-	-	-	-	-
645352: <i>Department of the Air Force Technical Architecture Design, Integration, and Evaluation</i>	-	0.000	0.000	82.438	0.000	82.438	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-	-	-

A. Mission Description and Budget Item Justification

The Department of the Air Force (DAF) Technical Architecture Design, Integration, and Evaluation activity resources two primary pillars - (1) DAF Architecture Design and Integration and (2) DAF Architecture Demonstration and Evaluation - to address critical gaps and move the DAF toward a superior architecture grounded in superior capabilities. This PE is not a new start, funding is realigned within the Department of the Air Force to this standalone PE to better align DAF objectives, since the DAF Technical Architecture, Design, Integration, and Evaluation activities enable open and integrated architectures across the entirety of the Department rather than any single program.

Potential adversaries are modernizing faster than anticipated. They are advancing individual systems while bringing families of systems (or systems of systems) together into an architecture to deny U.S. interests and counter potential U.S. action. One such example is the increasingly coupled investments and integration of space, air, and maritime sensing with long-range missile systems. The mix of capabilities and the integration of capabilities are just as important as the individual systems themselves because they have to work together in order to achieve the necessary operational effects and do so on increasingly rapid timelines. Successful companies follow a similar approach across product lines, and the same approach is needed for the DAF. The DAF must not only invest in superior capabilities but also invest in superior architectures that enable those capabilities to both integrate and modernize.

First, the DAF Force needs a technical architecture that couples with operational mission threads, such as Decision Superiority and Information Advantage, Agile Combat Employment with Distributed Operations and Layered Defense, Rapid All-Domain Kill Chains, Logistics Under Attack, and Space Defense. The Department does not have an integrated reference architecture. Therefore, it should not be a surprise if capabilities do not work together as desired or the technical achievements fail to match the desired operational effects intended by warfighters across the Air Force and Space Force. An integrated architecture is necessary and must regularly and dynamically mature as threats advance and new technological opportunities arise. In other words an architecture must play both defense and offense effectively to adapt to these challenges and opportunities. This architecture must also flex vertically - meaning programs and platforms themselves must be built with agility via open systems and open standards so that they can adapt and upgrade components quickly in response to threats or opportunities to integrate technology as advances are made. While having an integrated architecture is far too uncommon in the Department of the Air Force, it is a standard commercial practice. Efforts in this arena often fail to produce the desired results as organizations often stop at the "blueprint" phase or the design phase and fail to move from a great design into mission-ready capabilities on the battlefield. Therefore, the next pillar is a critical companion to achieving results.

Second, the DAF needs to experiment with and test these systems of systems. The Department of the Air Force does not have a deliberate campaign that integrates demonstration and evaluation at the force-level (i.e., architecture level). Great designs may not have traction when meeting reality, and traditional system-level testing and experimentation are not designed to yield insights into the effectiveness of capabilities working together to achieve integrated mission effects. This is the perennial

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force	Date: May 2021
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Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 0604006F / <i>Department of the Air Force Technical Architecture Design, Integration, and Evaluation</i>
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problem of not demonstrating and evaluating like one fights. Architecture Demonstrations and Evaluations, which were originally conceived to be focused on networking, ultimately serve a much broader purpose in highlighting architecture gaps and potential solutions. By taking Architecture Demonstrations and Evaluations to the field, the Department of the Air Force has uncovered mission-critical gaps that might not have been found at test ranges—meaning they would have been discovered on the road to conflict when it would likely be too late to correct. Therefore, a regular campaign of learning at the architecture level—with demonstration and evaluation of how and where the Department of the Air Force fights is critical to moving to a deliberate approach that impacts overall architecture design, investments, requirements for future capabilities, and acquisition baseline updates for current systems.

This activity is directed by the Chief Architect of the Department of the Air Force with oversight by the Secretary of the Air Force alongside the Chief of Staff of the Air Force and Chief of Space Operations. This activity is executed by the Air Force Research Laboratory.

This program element may include necessary emergent or unanticipated civilian pay expenses required to manage, execute, and deliver Department of the Air Force Technical Architecture Design, Integration, and Evaluation for emergent or unanticipated weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program element 0605831F.

This effort is in Budget Activity 4, Advanced Component Development and Prototypes (ACD&P), because efforts are necessary to evaluate integrated technologies, representative modes or prototype systems in a high fidelity and realistic operating environment.

B. Program Change Summary (\$ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Previous President's Budget	0.000	0.000	0.000	0.000	0.000
Current President's Budget	0.000	0.000	82.438	0.000	82.438
Total Adjustments	0.000	0.000	82.438	0.000	82.438
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	0.000	0.000			
• Other Adjustments	0.000	0.000	82.438	0.000	82.438

Change Summary Explanation

FY 2022 funding increased compared to FY 2021 by 82.438 million. Funding increased due to realignment of resources within the Department of the Air Force from PE 0604003F Advanced Battle Management System (ABMS) to PE 0604006F Department of the Air Force Technical Architecture Design, Integration, and Evaluation to better align Department of the Air Force objectives, since Department of the Air Force Technical Architecture Design, Integration, and Evaluation enables transition and open architecture across the entirety of the Department of the Air Force rather than within a single program. This is not a new start.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force		Date: May 2021		
Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>		R-1 Program Element (Number/Name) PE 0604006F / <i>Department of the Air Force Technical Architecture Design, Integration, and Evaluation</i>		
C. Accomplishments/Planned Programs (\$ in Millions)		FY 2020	FY 2021	FY 2022
<p>Title: DAF Architecture Design and Integration</p> <p>Description: The Department does not have an integrated reference architecture. Therefore, it should not be a surprise if capabilities do not work together as desired or the technical achievements fail to match the desired operational effects intended by warfighters across the Air Force and Space Force. An integrated architecture is critical and must regularly and dynamically mature as threats advance and new technological opportunities arise. In other words an architecture must play both defense and offense effectively to adapt to these challenges and opportunities. This architecture must also flex vertically - meaning programs and platforms themselves must be built with agility via open systems and open standards so that they can adapt and upgrade components quickly in response to threats or opportunities to integrate technology as advances are made. While having an integrated architecture is less common in the Department, it is a standard commercial practice. This pillar focuses on closing these systems and systems-of-systems modularity and integrated capability gaps.</p> <p>The Department of the Air Force Architecture Design and Integration pillar focuses on horizontal integration of vertically-oriented weapon systems in order to deliver superior systems-of-systems capabilities under different mission scenarios as well as enable those weapon systems with open standards and modular open system. This pillar develops mission-focused and functional architectures, fosters open standards and open systems approaches, establishes cloud-based environments to enable cross-cutting architecture development across Program Executive Offices, Major Commands, and Space Deltas, analyzes the technical and operational feasibility of new technical concepts that may be brought into the architecture through the science, technology, research, development and experimentation enterprises, and fosters the integration of capabilities into the architecture.</p> <p>FY 2021 Plans: N/A</p> <p>FY 2022 Plans: FY 2022 plans capitalize on DAF Architecture Design and Integration activities previously accomplished within individual programs and will include objectives such as: (1) design technical architectures to enable Department of the Air Force Service Chiefs' cross-cutting priority missions, including Decision Superiority and Information Advantage, Agile Combat Employment, Distributed Operations, and Layered Defense, and Rapid All-domain Kill Chains; (2) design and develop functional cross-cutting architectures such as an enterprise data architecture and associated infrastructure; (3) foster and mature accessible open architecture and standards to enable program agility and adaptability; (4) develop foundational cloud-based digital models of Air Force and Space Force platforms across classification levels; and (5) help drive current and future programs towards the architecture through program objective investments and acquisition program modernization.</p> <p>FY 2021 to FY 2022 Increase/Decrease Statement: FY 2022 funding increased compared to FY 2021 by 29.106 million. Funding increased due to realignment of resources within the Department of the Air Force from PE 0604003F ABMS to PE 0604006F Department of the Air Force Technical Architecture</p>		-	0.000	29.106

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force		Date: May 2021		
Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>		R-1 Program Element (Number/Name) PE 0604006F / <i>Department of the Air Force Technical Architecture Design, Integration, and Evaluation</i>		
C. Accomplishments/Planned Programs (\$ in Millions)		FY 2020	FY 2021	FY 2022
Design, Integration, and Evaluation to better align Department of the Air Force objectives, since Department of the Air Force Technical Architecture Design, Integration, and Evaluation enables transition and open architecture across the entirety of the Department of the Air Force rather than within a single program. This is not a new start.				
Title: DAF Architecture Demonstration and Evaluation		-	0.000	53.332
<p>Description: Department of the Air Force (DAF) Architecture Demonstration and Evaluation demonstrates and evaluates the integration of capabilities, not just individual capabilities. This work is a deliberate campaign that integrates demonstration and evaluation at the force-level (i.e., architecture level). This is critical because great designs on paper may not have traction when meeting reality, and traditional system-level testing and experimentation are not designed to yield insights into the effectiveness of capabilities working together to achieve integrated mission effects. By taking Architecture Demonstrations and Evaluations to the field, the DAF also uncovers mission-critical gaps that may not be uncovered at test ranges—meaning they would have been discovered on the road to conflict when it could be too late to correct. Therefore, a regular campaign of learning at the architecture level with demonstration and evaluation of how and where the Department of the Air Force fights is critical to moving from simply buying systems and hoping they compose into a family of systems in conflict to a deliberate approach that impacts overall architecture design, investments, requirements for future capabilities, and acquisition baseline updates for current systems. The DAF Architecture Demonstration and Evaluation effort focuses on addressing these needs.</p> <p>The DAF Architecture Demonstration and Evaluation pillar enables and conducts architecture-level demonstration and testing throughout the year and specifically at capstone Architecture Evaluations at key points to evaluate the integrated mission-oriented and functional-oriented architectures. These events further evaluate agility by adjusting operational scenarios from technical sprint to technical sprint to better reflect the uncertainty that a potential conflict might bring. The live demonstrations also enable focused objectives for integration with the joint force, allies, and partners and lower barriers to transition prototypes into operational programs. The Architecture Evaluations approach is modeled after modern commercial industry best practices and elements of the Special Operations community. This line of effort also includes costs for architecture evaluation infrastructure, test personnel, range access, consumables, travel, operational concept and non-materiel development, technical sprints to solve near-term gaps, and other evaluation-specific activities. The necessity of conducting evaluations at the architecture level and the speed required by the operational needs compel enhanced approaches to traditional test and analysis capabilities, namely new, innovative, and sufficiently-resourced test and analysis infrastructure, networks, and core subject matter expertise to include employment of military, civilian, reserve, and contractor capabilities.</p> <p>FY 2021 Plans: N/A</p> <p>FY 2022 Plans: FY 2022 plans capitalize on DAF Architecture Demonstration and Evaluation activities previously accomplished within individual programs and will include objectives such as: (1) demonstrate and evaluate technical architecture designs to enable Department</p>				

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force	Date: May 2021
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Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 0604006F / <i>Department of the Air Force Technical Architecture Design, Integration, and Evaluation</i>
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C. Accomplishments/Planned Programs (\$ in Millions)	FY 2020	FY 2021	FY 2022
<p>of the Air Force Service Chiefs' cross-cutting priority missions, including Decision Superiority and Information Advantage, Agile Combat Employment, Distributed Operations, and Layered Defense, and Rapid All-domain Kill Chains as well as functional architectures such as enterprise data capabilities; (2) identify needed changes to architectures and architecture-driven requirements for modernization programs and program objective budget investments; (3) solve select "quick win" technical gaps identified as part of the evaluations; (4) assess the military utility of technology solutions to achieve the Department of the Air Force architecture designs; and (5) enhance evaluation infrastructure at test locations and augment relocatable test capabilities to enable Continental United States and Outside the Continental United States evaluations.</p> <p><i>FY 2021 to FY 2022 Increase/Decrease Statement:</i> FY 2022 funding increased compared to FY 2021 by \$53.332 million. Funding increased due to realignment of resources within the Department of the Air Force from PE 0604003F ABMS to PE 0604006F Department of the Air Force Technical Architecture Design, Integration, and Evaluation to better align Department of the Air Force objectives, since Department of the Air Force Technical Architecture Design, Integration, and Evaluation enables transition and open architecture across the entirety of the Department of the Air Force rather than within a single program. This is not a new start.</p>			
Accomplishments/Planned Programs Subtotals	-	0.000	82.438

D. Other Program Funding Summary (\$ in Millions)

N/A

Remarks

This is a continuation of FY 2021 efforts in PE 0604003F ABMS realigned to PE 0604006F Department of the Air Force Technical Architecture Design, Integration, and Evaluation in order to better align Department of the Air Force objectives since Department of the Air Force Technical Architecture Design, Integration, and Evaluation enables transition and open architecture across the entirety of the Department of the Air Force rather than within a single program. This is not a new start.

E. Acquisition Strategy

Contracting strategies vary based on activity; please see R3 for additional details.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0604006F / Department of the Air Force Technical Architecture Design, Integration, and Evaluation	Project (Number/Name) 645352 / Department of the Air Force Technical Architecture Design, Integration, and Evaluation
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Product Development (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
DAF Architecture Design and Integration Contract 1	MIPR	Various : Various	-	-		-		3.185	Nov 2021	-		3.185	-	-	-
DAF Architecture Design and Integration Contract 2	MIPR	MIT/LL : Lexington, MA	-	-		-		3.006	Nov 2021	-		3.006	-	-	-
DAF Architecture Design and Integration Modeling and Analysis Contract 1	MIPR	Various : Various	-	-		-		2.513	Nov 2021	-		2.513	-	-	-
DAF Architecture Design and Integration Modeling and Analysis Contract 2	MIPR	JHU APL : Laurel, MD	-	-		-		3.981	Nov 2021	-		3.981	-	-	-
DAF Architecture Design and Integration Modeling and Analysis Infrastructure	RO	SAIC : Reston, VA	-	-		-		0.904	Nov 2021	-		0.904	-	-	-
DAF Architecture Technology Solutions Sprint 1	Various	Various : Various	-	-		-		5.440	Dec 2021	-		5.440	-	-	-
DAF Architecture Technology Solutions Sprint 2	Various	Various : Various	-	-		-		6.620	Apr 2022	-		6.620	-	-	-
DAF Architecture Technology Solutions Sprint 3	Various	Various : Various	-	-		-		5.858	Jul 2022	-		5.858	-	-	-
DAF Mission Architecture	MIPR	Various : Various	-	-		-		5.065	Dec 2021	-		5.065	-	-	-
DAF Program Architecture	MIPR	Various : Various	-	-		-		3.397	Dec 2021	-		3.397	-	-	-
Subtotal			-	-		-		39.969		-		39.969	-	-	N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0604006F / Department of the Air Force Technical Architecture Design, Integration, and Evaluation	Project (Number/Name) 645352 / Department of the Air Force Technical Architecture Design, Integration, and Evaluation
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Support (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
DAF Architecture Designand Evaluation Support	MIPR	Various : Various	-	-		-		4.673	Nov 2021	-		4.673	-	-	-
DAF ArchitectureEngineering Support	Reqn	Various : Various	-	-		-		8.145	Oct 2021	-		8.145	-	-	-
Subtotal			-	-		-		12.818		-		12.818	-	-	N/A

Test and Evaluation (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
DAF ArchitectureEvaluation	Various	Various : Various	-	-		-		3.971	Dec 2021	-		3.971	-	-	-
DAF ArchitectureEvaluation ExecutionTeam	MIPR	Booz Allen Hamilton : McClean, VA	-	-		-		10.650	Oct 2021	-		10.650	-	-	-
DAF ArchitectureEvaluation MissionExecution	Various	Various : Various	-	-		-		2.986	Dec 2021	-		2.986	-	-	-
DAF ArchitectureEvaluation Infrastructure	Various	Various : Various	-	-		-		6.966	Dec 2021	-		6.966	-	-	-
Subtotal			-	-		-		24.573		-		24.573	-	-	N/A

Management Services (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Program ManagementAdministration	Various	Various : Various	-	-		-		5.078	Oct 2021	-		5.078	-	-	-

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Exhibit R-4, RDT&E Schedule Profile: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0604006F / <i>Department of the Air Force Technical Architecture Design, Integration, and Evaluation</i>	Project (Number/Name) 645352 / <i>Department of the Air Force Technical Architecture Design, Integration, and Evaluation</i>

FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

<i>DAF Architecture Design and Integration</i>	
Mission Priority: Decision Superiority and Information Advantage	████████████████████
Mission Priority: Agile Combat Employment with Distributed Operations and Layered Defense	██
Mission Priority: Rapid All-Domain Kill Chains	██
Cross Service Architecture With Navy and Army	██
Mission Priority: Logistics Under Attack	██
Mission Priority: Space Operations	██
Functional Priority: Data and Infrastructure Architecture	██
Digital Model Development of Platforms and Environments	██
<i>DAF Architecture Demonstration and Evaluation</i>	
Mission Priority: Decision Superiority and Information Advantage	██
Mission Priority: Agile Combat Employment with Distributed Operations and Layered Defense	██
Mission Priority: Rapid All-Domain Kill Chains	██
Cross-Service Demonstration Integration	██
Mission Priority: Logistics Under Attack	██
Mission Priority: Space Operations	██

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Exhibit R-4, RDT&E Schedule Profile: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0604006F / Department of the Air Force <i>Technical Architecture Design, Integration, and Evaluation</i>	Project (Number/Name) 645352 / Department of the Air Force <i>Technical Architecture Design, Integration, and Evaluation</i>
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	FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

Technology Solution Sprints	
Evaluation Infrastructure for Fixed and Mobile Testing	

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Exhibit R-4A, RDT&E Schedule Details: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0604006F / <i>Department of the Air Force Technical Architecture Design, Integration, and Evaluation</i>	Project (Number/Name) 645352 / <i>Department of the Air Force Technical Architecture Design, Integration, and Evaluation</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>DAF Architecture Design and Integration</i>				
Mission Priority: Decision Superiority and Information Advantage	1	2022	1	2023
Mission Priority: Agile Combat Employment with Distributed Operations and Layered Defense	1	2022	1	2024
Mission Priority: Rapid All-Domain Kill Chains	1	2022	3	2024
Cross Service Architecture With Navy and Army	2	2022	2	2024
Mission Priority: Logistics Under Attack	1	2024	2	2026
Mission Priority: Space Operations	4	2022	2	2026
Functional Priority: Data and Infrastructure Architecture	1	2022	4	2023
Digital Model Development of Platforms and Environments	1	2022	4	2026
<i>DAF Architecture Demonstration and Evaluation</i>				
Mission Priority: Decision Superiority and Information Advantage	1	2022	4	2023
Mission Priority: Agile Combat Employment with Distributed Operations and Layered Defense	1	2022	4	2025
Mission Priority: Rapid All-Domain Kill Chains	1	2022	4	2024
Cross-Service Demonstration Integration	4	2022	4	2024
Mission Priority: Logistics Under Attack	2	2024	4	2026
Mission Priority: Space Operations	4	2023	4	2026
Technology Solution Sprints	1	2022	4	2026
Evaluation Infrastructure for Fixed and Mobile Testing	2	2022	4	2026

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity					R-1 Program Element (Number/Name)							
3600: <i>Research, Development, Test & Evaluation, Air Force I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>					PE 0604015F / <i>Long Range Strike - Bomber</i>							
COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
Total Program Element	-	2,878.798	2,843.214	2,872.624	0.000	2,872.624	-	-	-	-	-	-
643308: <i>Long Range Strike Bomber</i>	-	2,878.798	2,843.214	2,872.624	0.000	2,872.624	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This program is reported in accordance with Title 10, United States Code, Section 119(a)(1) in the Special Access Program Annual Report to Congress. For further information, please contact the Director of Special Programs, OUSD(A&S)/DSP.

This effort is in Budget Activity 4, Advanced Component Development and Prototypes (ACD&P), because efforts are necessary to evaluate integrated technologies, representative modes or prototype systems in a high fidelity and realistic operating environment.

B. Program Change Summary (\$ in Millions)

	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Previous President's Budget	2,982.499	2,848.410	2,896.926	0.000	2,896.926
Current President's Budget	2,878.798	2,843.214	2,872.624	0.000	2,872.624
Total Adjustments	-103.701	-5.196	-24.302	0.000	-24.302
• Congressional General Reductions	0.000	-5.196			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	-103.701	0.000			
• Other Adjustments	0.000	0.000	-24.302	0.000	-24.302

Change Summary Explanation

This program is reported in accordance with Title 10, United States Code, Section 119(a)(1) in the Special Access Program Annual Report to Congress. For further information, please contact the Director of Special Programs, OUSD(A&S)/DSP.

C. Accomplishments/Planned Programs (\$ in Millions)

	FY 2020	FY 2021	FY 2022
Title: Long Range Strike Bomber	2,878.798	2,843.214	2,872.624
Description: Long Range Strike Bomber			

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force	Date: May 2021
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Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force / BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 0604015F / <i>Long Range Strike - Bomber</i>
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C. Accomplishments/Planned Programs (\$ in Millions)	FY 2020	FY 2021	FY 2022
<p>FY 2021 Plans: Program continuation in 2021.</p> <p>This program is reported in accordance with Title 10, USC, Section 119(a)(1) in the Special Access Program Annual Report to Congress. For further information, please contact the Director of Special Programs, OUSD(A&S)/DSP.</p> <p>FY 2022 Plans: Program continuation in 2022.</p> <p>This program is reported in accordance with Title 10, USC, Section 119(a)(1) in the Special Access Program Annual Report to Congress. For further information, please contact the Director of Special Programs, OUSD(A&S)/DSP.</p> <p>FY 2021 to FY 2022 Increase/Decrease Statement: This program is reported in accordance with Title 10, USC, Section 119(a)(1) in the Special Access Program Annual Report to Congress. For further information, please contact the Director of Special Programs, OUSD(A&S)/DSP.</p>			
Accomplishments/Planned Programs Subtotals	2,878.798	2,843.214	2,872.624

D. Other Program Funding Summary (\$ in Millions)

<u>Line Item</u>	<u>FY 2020</u>	<u>FY 2021</u>	<u>FY 2022</u>	<u>FY 2022</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>FY 2026</u>	<u>Cost To</u>	<u>Total Cost</u>
			<u>Base</u>	<u>OCO</u>	<u>Total</u>					<u>Complete</u>	
• MILCON PE 0604015: <i>Long Range Strike Bomber</i>	-	10.000	343.000	-	343.000	-	-	-	-	-	-

Remarks

E. Acquisition Strategy
This program is reported in accordance with Title 10, United States Code, Section 119(a)(1) in the Special Access Program Annual Report to Congress. For further information, please contact the Director of Special Programs, OUSD(A&S)/DSP.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0604015F / Long Range Strike - Bomber	Project (Number/Name) 643308 / Long Range Strike Bomber
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Product Development (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Actual breakout provided in Special Access Program Annual Report to Congress	Various	N/A : NV	-	2,878.798		2,843.214		2,872.624		-		2,872.624	-	-	-
Subtotal			-	2,878.798		2,843.214		2,872.624		-		2,872.624	-	-	N/A
Project Cost Totals			-	2,878.798		2,843.214		2,872.624		-		2,872.624	-	-	N/A

Remarks
 This program is reported in accordance with Title 10, United States Code, Section 119(a)(1) in the Special Access Program Annual Report to Congress. For further information, please contact the Director of Special Programs, OUSD(A&S)/DSP.

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Exhibit R-4, RDT&E Schedule Profile: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0604015F / <i>Long Range Strike - Bomber</i>	Project (Number/Name) 643308 / <i>Long Range Strike Bomber</i>
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FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

<i>Long Range Strike Bomber</i>	
Actual schedule provided in Special Access Program Annual Report to Congress	

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Exhibit R-4A, RDT&E Schedule Details: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0604015F / <i>Long Range Strike - Bomber</i>	Project (Number/Name) 643308 / <i>Long Range Strike Bomber</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>Long Range Strike Bomber</i>				
Actual schedule provided in Special Access Program Annual Report to Congress	1	2020	4	2026

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 0604032F / <i>Directed Energy Prototyping</i>
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COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
Total Program Element	-	42.390	19.429	10.820	0.000	10.820	-	-	-	-	-	-
640200: <i>DE Prototyping</i>	-	42.390	19.429	10.820	0.000	10.820	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-	-	-

A. Mission Description and Budget Item Justification

The Air Force Life Cycle Management Center, Architecture and Integration Directorate Directed Energy Prototyping Program acquires and evaluates prototype high energy laser, high power microwave and/or other electromagnetic radiation or particle beam technologies as a future integral component of the Airbase defense mission. The Directed Energy Prototyping Program bridges the gap between lab based technology demonstration under a controlled environment, and demonstration of a system in realistic environments with the intent of establishing successful acquisition, and operation or operational capability implementation.

This prototyping effort enables the ability to integrate the directed energy prototype systems with other operational systems required for the mission (e.g. radar, command and control, etc.), conduct test and evaluation activities, and mature emerging directed energy technology systems based on prototyping activities to enable rapid fielding to the warfighter. The Directed Energy Prototyping Program allows acquisition program managers (capability developers) and warfighters (capability recipients and end users) to prototype, integrate, evaluate, and demonstrate candidate weapon technologies and assess them in an operational environment with the intent of iteratively maturing directed energy technologies to a production representative design.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver science & technology capabilities. It may also include necessary civilian pay expenses required to perform analysis and developmental activities required in support of the transition of weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program elements 0605826F, 0605827F, 0605828F, 0605829F, 0605830F, 0605831F, 0605832F, 0605898F, and 0605833F.

This effort is in Budget Activity 4, Advanced Component Development and Prototypes (ACD&P), because efforts are necessary to evaluate integrated technologies, representative modes or prototype systems in a high fidelity and realistic operating environment.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 0604032F / <i>Directed Energy Prototyping</i>
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B. Program Change Summary (\$ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Previous President's Budget	44.000	20.964	10.983	0.000	10.983
Current President's Budget	42.390	19.429	10.820	0.000	10.820
Total Adjustments	-1.610	-1.535	-0.163	0.000	-0.163
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	-1.535			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	-1.610	0.000			
• Other Adjustments	0.000	0.000	-0.163	0.000	-0.163

Congressional Add Details (\$ in Millions, and Includes General Reductions)

Project: 640200: *DE Prototyping*

Congressional Add: *Program increase - Counter-UAS targeting solution*

Congressional Add: *Unfunded Requirement*

Congressional Add Subtotals for Project: 640200

Congressional Add Totals for all Projects

	FY 2020	FY 2021
	14.000	-
	20.000	-
	34.000	-
	34.000	-

Change Summary Explanation

Undistributed Mark: FY 2021 \$35 million

Decrease from FY 2021 to FY 2022 of \$8.609 million is due to planned completion of non-recurring engineering and manufacturing tasks no longer required.

Congressional Mark: Decrease FY 2021 \$1.5 million

C. Accomplishments/Planned Programs (\$ in Millions)

	FY 2020	FY 2021	FY 2022
Title: Directed Energy Capabilities	8.390	19.429	10.820
Description: Prototypes and evaluates Directed energy weapon technologies for Airbase Defense against unmanned aerial vehicles and cruise missiles, Precision Strike against electronic and conventional targets and Aircraft Defense against incoming threats.			
FY 2021 Plans:			

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force	Date: May 2021
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Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 0604032F / <i>Directed Energy Prototyping</i>
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C. Accomplishments/Planned Programs (\$ in Millions)	FY 2020	FY 2021	FY 2022
Continue to test and evaluate acquired systems to determine operational effectiveness. Results from operational testing will be used to consider program initiation. Opening operating location at Kirtland Air Force Base to support transition, test, and evaluation of directed energy technologies.			
FY 2022 Plans: Continue to test and evaluate acquired DE C-UAS prototype systems to determine system capability and operational effectiveness. Results from operational assessment will be used to support future fielding/Program of Record decision.			
FY 2021 to FY 2022 Increase/Decrease Statement: FY 2022 decreased compared to FY 2021 by \$8.609 million. Funding decreased due to the planned upfront non-recurring costs for these prototypes complete in FY 2021 and are no longer required in FY 2022. Funding in FY 2022 and beyond includes continuation of Air Force' emphasis on the acceleration of developing high power microwave counter-unmanned aerial system enhancements.			
Accomplishments/Planned Programs Subtotals	8.390	19.429	10.820

	FY 2020	FY 2021
Congressional Add: Program increase - Counter-UAS targeting solution	14.000	-
FY 2020 Accomplishments: Conduct Congressional directed efforts.		
Congressional Add: Unfunded Requirement	20.000	-
FY 2020 Accomplishments: Conduct Congressional directed efforts.		
Congressional Adds Subtotals	34.000	-

D. Other Program Funding Summary (\$ in Millions)

N/A

Remarks

N/A

E. Acquisition Strategy

During FY 2020, the Air Force Life Cycle Management Center, Architecture and Integration Directorate, Wright-Patterson Air Force Base, Ohio conducted a source selection evaluating eight (8) ground-based Counter Unmanned Aerial Systems for prototype development. In 4QFY20, three (3) vendors were selected for award using Other Transaction Authority based on a best value determination with Technical being the most important factor. During FY21, these three (3) prototypes will be evaluated and potentially down-selected at specific testing gates based on operational capability/suitability assessment supporting the Airbase defense mission.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity	R-1 Program Element (Number/Name)
3600: <i>Research, Development, Test & Evaluation, Air Force I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	PE 0604032F / <i>Directed Energy Prototyping</i>

After operational assessment is complete in FY 2022, the selected prototype(s) will be iterated to production representative with incremental improvements, while documenting design, sustainment, and initial operational concepts of operation information to support a future program of record.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0604032F / <i>Directed Energy Prototyping</i>	Project (Number/Name) 640200 / <i>DE Prototyping</i>
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Product Development (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Directed Energy Prototypes	C/FFP	Various : Various	-	6.390	Mar 2021	7.429	Mar 2021	-		-		-	-	-	-
Congressional Add: Program Increase Counter-UAS targeting solution	C/FFP	Not specified. : TBD	-	14.000	Mar 2021	-		-		-		-	-	-	-
Congressional Add: Unfunded Requirement	C/FFP	Not specified. : TBD	-	20.000	Dec 2020	-		-		-		-	-	-	-
Subtotal			-	40.390		7.429		-		-		-	-	-	N/A

Test and Evaluation (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Directed Energy C-UAS Prototype Technical Maturation and Improvements	Various	Various : Various	-	0.000		10.000	May 2021	8.820	Apr 2022	-		8.820	-	-	-
Subtotal			-	0.000		10.000		8.820		-		8.820	-	-	N/A

Management Services (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Directed Energy Prototyping Program Administration	Various	AFLCMC : Various	-	2.000	Oct 2019	2.000	Oct 2020	2.000	Oct 2021	-		2.000	-	-	-
Subtotal			-	2.000		2.000		2.000		-		2.000	-	-	N/A

			Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals			-	42.390	19.429	10.820	-	10.820	-	-	N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0604032F / <i>Directed Energy Prototyping</i>	Project (Number/Name) 640200 / <i>DE Prototyping</i>
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	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
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Remarks
 FY 2022 - FY 2026 will concentrate on prototyping and maturing high energy laser and high power microwave systems for base area defense in preparation for transition to program of record. The program makes use of Other Transactional Authorities (OTA). Continued support will be provided by the Directed Energy Transition Management Office, Kirtland Air Force Base, New Mexico.

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Exhibit R-4A, RDT&E Schedule Details: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0604032F / <i>Directed Energy Prototyping</i>	Project (Number/Name) 640200 / <i>DE Prototyping</i>
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Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>Prototype Manufacturing</i>				
Prototype build and contractor test	4	2020	4	2021
<i>Operational Test</i>				
Government assessment of suitability and effectiveness for field operations	4	2021	3	2022
<i>Directed Energy Counter-Unmanned Aerial System (C-UAS) technical maturation</i>				
Incremental improvements to of Directed Energy C-UAS Prototype systems to provide increased Airbase defense C-UAS capability to warfighter	2	2021	4	2024
<i>Directed Energy Base Defense technical maturation</i>				
Mature Directed Energy technologies to enhance the Airbase defense layered architecture. Increasing defensive capabilities to include cruise missiles and other airborne threats.	4	2023	4	2026

Note

FY 2022 - FY 2026 will concentrate on maturing high energy laser and high power microwave systems for base area defense in preparation for transition of prototype weapon systems to program(s) of record. The program makes use of Other Transactional Authorities (OTA). Continued support will be provided by the Directed Energy Transition Management Office, Kirtland Air Force Base, New Mexico.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>					R-1 Program Element (Number/Name) PE 0604033F / <i>Hypersonics Prototyping</i>							
COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
Total Program Element	-	566.935	386.157	438.378	0.000	438.378	-	-	-	-	-	-
643882: <i>Air-Launched Rapid Response Weapon (ARRW)</i>	-	286.000	386.157	238.262	0.000	238.262	-	-	-	-	-	-
643883: <i>Hypersonic Attack Cruise Missile</i>	-	0.000	0.000	200.116	0.000	200.116	-	-	-	-	-	-
643885: <i>Hypersonic Conventional Strike Weapon (HCSW)</i>	-	280.935	0.000	0.000	0.000	0.000	-	-	-	-	-	-

Note

This program, BA 4, PE 0604033F, project 643883, Hypersonic Attack Cruise Missile (HACM), is a new start.

A. Mission Description and Budget Item Justification

The Hypersonics Prototyping program enables integration and demonstration of emerging hypersonic technologies in an operational or operational-like environment to capitalize on successful laboratory hypersonic research and development efforts with high warfighter priority. Integration and demonstration of hypersonic prototypes also allows leadership to make informed strategy and resource decisions for future programs based on the results of such hypersonic prototype demonstrations.

Hypersonic Prototyping enables a key linkage between research and development in the lab and fielding advanced technologies to the warfighter. Under this program, Air-Launched Rapid Response Weapon (ARRW), Hypersonic Conventional Strike Weapon (HCSW), and the Hypersonic Attack Cruise Missile (HACM) will accelerate the technology transfer of hypersonic technologies to enable a responsive, long range strike capability. In FY 2020, the HCSW program was concluded at the completion of the Critical Design Review (CDR) in March 2020.

Hypersonic Attack Cruise Missile (HACM) is a new start for FY 2022.

Throughout this program element will be future hypersonics development, which will incubate and mature new technologies, processes, and resources for the development and demonstration of hypersonic technology including, but not limited to, infrastructure advancements, digital engineering, open systems architecture, modeling and simulation, analytics, and high performance computing environments.

BY funding totals include \$200.116 million requested for the Pacific Defense Initiative.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity	R-1 Program Element (Number/Name)
3600: <i>Research, Development, Test & Evaluation, Air Force I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	PE 0604033F / <i>Hypersonics Prototyping</i>

This program element may include necessary civilian pay expenses required to manage, execute, and deliver Hypersonic Prototyping weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program element 0605831F. In PY 6.642 million and in CY 4.143 million was expended for civilian pay expenses in this program element.

This effort is in Budget Activity 4, Advanced Component Development and Prototypes (ACD&P), because efforts are necessary to evaluate integrated technologies, representative modes or prototype systems in a high fidelity and realistic operating environment.

B. Program Change Summary (\$ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Previous President's Budget	576.000	381.862	198.898	0.000	198.898
Current President's Budget	566.935	386.157	438.378	0.000	438.378
Total Adjustments	-9.065	4.295	239.480	0.000	239.480
• Congressional General Reductions	0.000	-0.705			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	5.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	-9.065	0.000			
• Other Adjustments	0.000	0.000	239.480	0.000	239.480

Congressional Add Details (\$ in Millions, and Includes General Reductions)

Project: 643882: *Air-Launched Rapid Response Weapon (ARRW)*

Congressional Add: *Program increase - Air-launched rapid response weapon*

Congressional Add Subtotals for Project: 643882

Project: 643885: *Hypersonic Conventional Strike Weapon (HCSW)*

Congressional Add: *Program Increase - Hypersonic Conventional Strike Weapon*

Congressional Add Subtotals for Project: 643885

Congressional Add Totals for all Projects

	FY 2020	FY 2021
	0.000	5.000
	0.000	5.000
	0.000	-
	0.000	-
	0.000	5.000

Change Summary Explanation

Other Adjustments increase in FY 2022 of \$239.480 million. \$200.116 million is for the HACM new start program. The additional \$39.364 million is for the ARRW program.

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force										Date: May 2021		
Appropriation/Budget Activity 3600 / 4					R-1 Program Element (Number/Name) PE 0604033F / <i>Hypersonics Prototyping</i>				Project (Number/Name) 643882 / <i>Air-Launched Rapid Response Weapon (ARRW)</i>			
COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
643882: <i>Air-Launched Rapid Response Weapon (ARRW)</i>	-	286.000	386.157	238.262	0.000	238.262	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Air-Launched Rapid Response Weapon (ARRW) project integrates Air Force and DARPA enabled system technologies into a prototype that will demonstrate the viability of this concept to be fielded as a long range prompt strike capability. ARRW will design, develop, manufacture, and test, a number of prototype vehicles to inform decisions concerning ARRW acquisition and production.

Future hypersonics development will incubate and mature new technology, processes, and resources for the development and demonstration of hypersonic technology including, but not limited to, infrastructure advancements, digital engineering, open systems architecture, modeling and simulation, analytics, and high performance computing environments.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver Air-Launched Rapid Response Weapon (ARRW) weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program element 0605831F.

B. Accomplishments/Planned Programs (\$ in Millions)

	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Title: Air Launched Rapid Response Weapon (ARRW)	286.000	381.157	238.262	-	238.262
Description: Integrates Air Force and DARPA enabled system technologies into a prototype that will demonstrate the viability of this concept to be fielded as a long range prompt strike capability. ARRW will design, develop, manufacture, and test, a number of prototype vehicles to inform decisions concerning ARRW acquisition and production.					
FY 2021 Plans: Continue with ARRW booster test flights. Manufacture and begin testing of the ARRW all-up round test vehicles.					
FY 2022 Base Plans: Complete manufacture and flight test of ARRW all-up round test vehicles; transition program to early operational capability.					
FY 2021 to FY 2022 Increase/Decrease Statement:					

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0604033F / <i>Hypersonics Prototyping</i>	Project (Number/Name) 643882 / <i>Air-Launched Rapid Response Weapon (ARRW)</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
FY 2022 decreased compared to FY 2021 by \$142.895 million. Funding decreased due to near program completion and transition to early operational capability.					
Accomplishments/Planned Programs Subtotals	286.000	381.157	238.262	-	238.262
	FY 2020	FY 2021			
Congressional Add: Program increase - Air-launched rapid response weapon	0.000	5.000			
FY 2020 Accomplishments: Not applicable					
FY 2021 Plans: Conducted congressionally directed efforts to improve critical technology supplier base.					
Congressional Adds Subtotals	0.000	5.000			

C. Other Program Funding Summary (\$ in Millions)

N/A

Remarks

Program office may require temporary relocatable structures for expansion to support workforce and meet mission requirements.

D. Acquisition Strategy

Acquisition Decision Memorandum (signed 3 May 2018) designated Air-Launched Rapid Response Weapon (ARRW) as Section 804 Rapid Prototyping Program.

The Air Force awarded in August 2018 an undefinitized contract in order to complete a critical design review and procure all long lead parts and materials. The ARRW Program definitized this contract December 2019 to include the entire RDT&E effort (through the end of flight test). The cost type contract includes schedule incentives. The government agency responsible for managing this program is the Air Force Life Cycle Management Center, Armament Directorate, Eglin AFB, FL.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Air Force											Date: May 2021				
Appropriation/Budget Activity 3600 / 4						R-1 Program Element (Number/Name) PE 0604033F / <i>Hypersonics Prototyping</i>					Project (Number/Name) 643882 / <i>Air-Launched Rapid Response Weapon (ARRW)</i>				

Product Development (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
ARRW - Contract	C/CPFF	LMCO: Various : TBD	-	233.355	Feb 2020	317.853	Feb 2021	163.830	Feb 2022	-		163.830	-	-	-
ARRW - Mission Planning	C/CPFF	Boeing: Tapestry : TBD	-	1.000	Mar 2020	1.565	Mar 2021	0.950	Mar 2022	-		0.950	-	-	-
ARRW - Aircraft Integration	Various	Various : TBD	-	10.650	Dec 2019	13.998	Dec 2020	0.524	Dec 2021	-		0.524	-	-	-
Congressional Add	TBD	TBD : TBD	-	-		5.000	Jun 2021	-		-		-	-	-	-
Subtotal			-	245.005		338.416		165.304		-		165.304	-	-	N/A

Remarks

ARRW - This effort is part of the DARPA Other Transaction Authority (OTA) and Air Force contracts.

Support (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Direct Cite Authority Civilian Pay	Allot	Not specified. : TBD	-	3.483	Oct 2019	4.143	Oct 2020	-		-		-	-	-	-
Subtotal			-	3.483		4.143		-		-		-	-	-	N/A

Test and Evaluation (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
ARRW - Government Test	Various	Various : TBD	-	31.094	May 2020	36.158	May 2021	59.275	May 2022	-		59.275	-	-	-
Subtotal			-	31.094		36.158		59.275		-		59.275	-	-	N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Air Force											Date: May 2021			
Appropriation/Budget Activity 3600 / 4					R-1 Program Element (Number/Name) PE 0604033F / <i>Hypersonics Prototyping</i>					Project (Number/Name) 643882 / <i>Air-Launched Rapid Response Weapon (ARRW)</i>				

Management Services (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
ARRW - Program Management Administration	Various	Multiple : TBD	-	6.418	Sep 2020	7.440	Sep 2021	13.683	Sep 2022	-		13.683	-	-	-
Subtotal			-	6.418		7.440		13.683		-		13.683	-	-	N/A

Remarks
Includes A&AS support requirements plus TDY, and office supplies.

	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	-	286.000	386.157	238.262	-	238.262	-	-	N/A

Remarks
Additional details on Hypersonics prototyping concepts can be provided in the appropriate forum.

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Exhibit R-4, RDT&E Schedule Profile: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0604033F / <i>Hypersonics Prototyping</i>	Project (Number/Name) 643882 / <i>Air-Launched Rapid Response Weapon (ARRW)</i>

	FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

<i>Air Launched Rapid Response Weapon (ARRW)</i>	
ARRW- Contract	[REDACTED]
Design and Preliminary Design Review	[REDACTED]
Design and Critical Design Review	[REDACTED]
Flight Tests	[REDACTED]
Program Management Administration	[REDACTED]

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Exhibit R-4A, RDT&E Schedule Details: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0604033F / <i>Hypersonics Prototyping</i>	Project (Number/Name) 643882 / <i>Air-Launched Rapid Response Weapon (ARRW)</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>Air Launched Rapid Response Weapon (ARRW)</i>				
ARRW- Contract	1	2020	4	2022
Design and Preliminary Design Review	1	2020	2	2020
Design and Critical Design Review	2	2020	4	2020
Flight Tests	3	2020	4	2022
Program Management Administration	1	2020	2	2023

Note

Further schedule details can be provided in the appropriate forum.

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 4					R-1 Program Element (Number/Name) PE 0604033F / Hypersonics Prototyping				Project (Number/Name) 643883 / Hypersonic Attack Cruise Missile			
COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
643883: Hypersonic Attack Cruise Missile	-	0.000	0.000	200.116	0.000	200.116	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

This program, BA 4, PE 0604033F, project 643883, Hypersonic Attack Cruise Missile (HACM), is a new start.

A. Mission Description and Budget Item Justification

Hypersonic Attack Cruise Missile (HACM) is a new start for FY 2022.

The HACM project integrates Air Force and Defense Advanced Research Projects Agency (DARPA) enabled system technologies into a prototype that will demonstrate the viability of a multi-mission weapon concept to be fielded as a long range prompt strike capability. HACM will design, develop, manufacture, and test, a number of prototype vehicles to inform decisions concerning future HACM acquisition and production.

Future hypersonics development will incubate and mature new technology, processes, and resources for the development and demonstration of hypersonic technology including, but not limited to, infrastructure advancements, digital engineering, open systems architecture, modeling and simulation, analytics, and high performance computing environments.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver HACM weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program element 0605831F.

BY funding totals include \$200.1M requested for the Pacific Defense Initiative.

B. Accomplishments/Planned Programs (\$ in Millions)

	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Title: Hypersonic Attack Cruise Missile (HACM)	-	0.000	200.116	0.000	200.116
Description: Integrates Air Force enabled system technologies into a prototype that will demonstrate the viability of a multi-mission weapon concept to be fielded as a long range prompt strike capability. Hypersonic Attack Cruise Missile (HACM) will design, develop, manufacture, and test, a number of prototype vehicles to inform decisions concerning HACM acquisition and production.					
HACM is a new start for FY 2022.					
FY 2021 Plans:					

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force	Date: May 2021
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Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0604033F / <i>Hypersonics Prototyping</i>	Project (Number/Name) 643883 / <i>Hypersonic Attack Cruise Missile</i>
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B. Accomplishments/Planned Programs (\$ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
N/A					
FY 2022 Base Plans: Contract Award, Digital System Modeling, Weapons Open System Architecture (WOSA) Evaluation, begin Operational Flight Program (OFP) Development, begin building aircraft integration assets, conduct Wind Tunnel Testing.					
FY 2022 OCO Plans: N/A					
FY 2021 to FY 2022 Increase/Decrease Statement: Funding increased because initial funding for program will be received in FY 2022.					
Accomplishments/Planned Programs Subtotals	-	0.000	200.116	0.000	200.116

C. Other Program Funding Summary (\$ in Millions)
N/A

Remarks

D. Acquisition Strategy
Will submit formal HACM strategy as part of Acquisition Strategy Panel (ASP) in FY 2021.

The ability to execute HACM development is contingent upon fully funded and successful predecessor capability development efforts.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0604033F / Hypersonics Prototyping	Project (Number/Name) 643883 / Hypersonic Attack Cruise Missile
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Product Development (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Hypersonic program office support, analysis, technical risk reduction, and development.	C/CPFF	Multiple: TBD: Various : TBD	-	-		-		167.065	Mar 2022	-		167.065	-	-	-
Subtotal			-	-		-		167.065		-		167.065	-	-	N/A

Support (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Development & Prototyping	C/CPFF	Multiple: TBD: Various : TBD	-	-		-		4.937	Dec 2021	-		4.937	-	-	-
Direct Cite Authority Civilian Pay	Allot	Not specified : TBD : TBD	-	-		-		4.663	Oct 2021	-		4.663	-	-	-
Subtotal			-	-		-		9.600		-		9.600	-	-	N/A

Test and Evaluation (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Test and Evaluation	C/CPAF	Multiple: TBD: Various : TBD	-	-		-		11.689	Nov 2021	-		11.689	-	-	-
Subtotal			-	-		-		11.689		-		11.689	-	-	N/A

Management Services (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Management Services	C/TBD	Multiple: TBD: Various : TBD	-	-		-		6.762	Oct 2021	-		6.762	-	-	-
Temporary Relocatable Structure	C/TBD	Not specified : TBD : TBD	-	-		-		5.000	Oct 2021	-		5.000	-	-	-

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Exhibit R-4, RDT&E Schedule Profile: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0604033F / <i>Hypersonics Prototyping</i>	Project (Number/Name) 643883 / <i>Hypersonic Attack Cruise Missile</i>
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	FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

<i>Hypersonic Attack Cruise Missile (HACM)</i>	
Critical Design Review	[REDACTED]

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Exhibit R-4A, RDT&E Schedule Details: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0604033F / <i>Hypersonics Prototyping</i>	Project (Number/Name) 643883 / <i>Hypersonic Attack Cruise Missile</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>Hypersonic Attack Cruise Missile (HACM)</i>				
Critical Design Review	3	2022	3	2023

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force										Date: May 2021		
Appropriation/Budget Activity 3600 / 4					R-1 Program Element (Number/Name) PE 0604033F / <i>Hypersonics Prototyping</i>				Project (Number/Name) 643885 / <i>Hypersonic Conventional Strike Weapon (HCSW)</i>			
COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
643885: <i>Hypersonic Conventional Strike Weapon (HCSW)</i>	-	280.935	0.000	0.000	0.000	0.000	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Hypersonic Conventional Strike Weapon (HCSW) Project integrates Air Force, Strategic Capabilities Office, and Conventional Prompt Strike (CPS) glide body into a prototype that will demonstrate the viability of this concept to be fielded as a long range prompt strike capability. HCSW will design, develop, manufacture, and test, a number of prototype vehicles to inform decisions concerning future HCSW acquisition and production.

In FY 2020, the HCSW program was concluded at the completion of Critical Design Review (CDR) in March 2020.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver HCSW weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program element 0605831F. In PY \$3.501M and in CY \$0.000M was expended for civilian pay expenses in this program element.

B. Accomplishments/Planned Programs (\$ in Millions)

	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Title: Hypersonic Conventional Strike Weapon (HCSW)	280.935	0.000	0.000	-	0.000
Description: Integrates Air Force enabled system technologies into a prototype that will demonstrate the viability of this concept to be fielded as a long range prompt strike capability. Hypersonic Conventional Strike Weapon (HCSW) will design, develop, manufacture, and test, a number of prototype vehicles to inform decisions concerning HCSW acquisition and production.					
In FY 2019, HCSW completed System Requirements Review (SRR) and Preliminary Design Review (PDR). In FY 2020, the HCSW program concluded at the completion of Critical Design Review (CDR) in March 2020.					
FY 2021 Plans: No activities planned for FY 2021 due to program completion in March 2020.					
FY 2022 Base Plans: No activities planned for FY 2022 due to program completion in March 2020.					
Accomplishments/Planned Programs Subtotals	280.935	0.000	0.000	-	0.000

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0604033F / <i>Hypersonics Prototyping</i>	Project (Number/Name) 643885 / <i>Hypersonic Conventional Strike Weapon (HCSW)</i>

	FY 2020	FY 2021
Congressional Add: Program Increase - Hypersonic Conventional Strike Weapon	0.000	-
FY 2020 Accomplishments: Not Applicable		
Congressional Adds Subtotals	0.000	-

C. Other Program Funding Summary (\$ in Millions)

N/A

Remarks

D. Acquisition Strategy

Acquisition Decision Memorandum (signed 3 May 2018) designated Hypersonic Conventional Strike Weapon (HCSW) as Section 804 Rapid Prototyping Program.

In April 2018, the Air Force awarded an Indefinite Delivery/Indefinite Quantity to Lockheed Martin Corporation Space for the design, development, engineering, systems integration, test, logistics, planning, and aircraft integration support of all the elements of a hypersonic, conventional, air-launched, stand-off weapon. The government agency responsible for managing this program is the Air Force Life Cycle Management Center, Armament Directorate, Eglin AFB, FL.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Air Force												Date: May 2021				
Appropriation/Budget Activity				R-1 Program Element (Number/Name)				Project (Number/Name)								
3600 / 4				PE 0604033F / Hypersonics Prototyping				643885 / Hypersonic Conventional Strike Weapon (HCSW)								
Product Development (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total				
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract	
Hypersonic program office support, analysis, technical risk reduction, and development.	C/CPFF	Lockheed Martin : Huntsville, AL	-	270.589	Nov 2019	-		-		-		-	-	-	-	
Subtotal			-	270.589		-		-		-		-	-	-	N/A	
Support (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total				
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract	
Development & Prototyping	C/CPFF	Multiple: TBD : Various	-	0.717	Nov 2019	-		-		-		-	-	-	-	
Direct Cite Authority Civilian Pay	Allot	Not specified : TBD : TBD	-	3.501	Oct 2019	-		-		-		-	-	-	-	
Subtotal			-	4.218		-		-		-		-	-	-	N/A	
Test and Evaluation (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total				
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract	
Test and Evaluation	C/CPAF	Multiple: TBD : Various	-	5.598	Jan 2020	-		-		-		-	-	-	-	
Subtotal			-	5.598		-		-		-		-	-	-	N/A	
Management Services (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total				
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract	
Management Services	C/TBD	Multiple: TBD : Various	-	0.530	Mar 2020	-		-		-		-	-	-	-	
Subtotal			-	0.530		-		-		-		-	-	-	N/A	

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0604033F / <i>Hypersonics Prototyping</i>	Project (Number/Name) 643885 / <i>Hypersonic Conventional Strike Weapon (HCSW)</i>
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Management Services (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			

Remarks
Includes A&AS support requirements, TDY, office supplies, and assessed penalties/withholds.

	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	-	280.935	0.000	-	-	-	-	-	N/A

Remarks

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Exhibit R-4A, RDT&E Schedule Details: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0604033F / <i>Hypersonics Prototyping</i>	Project (Number/Name) 643885 / <i>Hypersonic Conventional Strike Weapon (HCSW)</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>Hypersonic Conventional Strike Weapon (HCSW)</i>				
Design and Preliminary Design Review	1	2020	1	2020
Critical Design Review	1	2020	2	2020

Note

Further schedule details can be provided in the appropriate forum.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity					R-1 Program Element (Number/Name)							
3600: <i>Research, Development, Test & Evaluation, Air Force I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>					PE 0604201F / <i>PNT Resiliency, Mods, and Improvements</i>							
COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
Total Program Element	-	120.267	0.000	39.742	0.000	39.742	-	-	-	-	-	-
641030: <i>GPS Receiver Development</i>	-	120.267	0.000	39.742	0.000	39.742	-	-	-	-	-	-

Note

This program, BA 4, PE 0604201F, project 641030, M-Code EAJ, is a new start.

A. Mission Description and Budget Item Justification

PE 0604201F, Project 641030 covers the research, development, qualification, and testing of Enhanced Anti-Jam (EAJ) Military Code (M-Code) Global Positioning System (GPS) receivers for Air Force and joint weapon systems. This includes updates to weapon mission planning software to support new M-Code and EAJ receiver development. These acquisitions will enable the Air Force to increase its operational Position, Navigation, and Timing (PNT) resiliency while satisfying the DoD and civil mandates. Fielding of EAJ M-Code weapons requires research, development, qualification and testing of M-Code receivers across the Air Force Program Executive Officer (AFPEO) Weapons portfolio. Funds may be used to address emerging and short notice Diminishing Manufacturing Sources and Material Shortages (DMSMS) issues.

This requirement supports performance of a full financial audit as required by title 10 U.S.C. Chapter 9A, Sec 240-D.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver weapon system capability. The use of such programs funds would be in addition to the civilian pay expenses budgeted in program element 0605831F. In FY20 \$0M was expended for civilian pay expenses in this program element, and in FY21 \$0M is forecasted for civilian pay expenses in this program element.

This effort is in Budget Activity 4, Advanced Component Development and Prototypes (ACD&P), because efforts are necessary to evaluate integrated technologies, representative modes or prototype systems in a high fidelity and realistic operating environment.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 0604201F / <i>PNT Resiliency, Mods, and Improvements</i>
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B. Program Change Summary (\$ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Previous President's Budget	124.600	0.000	0.000	0.000	0.000
Current President's Budget	120.267	0.000	39.742	0.000	39.742
Total Adjustments	-4.333	0.000	39.742	0.000	39.742
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	-4.333	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	0.000	0.000			
• Other Adjustments	0.000	0.000	39.742	0.000	39.742

Congressional Add Details (\$ in Millions, and Includes General Reductions)

Project: 641030: *GPS Receiver Development*

Congressional Add: *Program Increase - M-Code EAJ*

Congressional Add Subtotals for Project: 641030

Congressional Add Totals for all Projects

	FY 2020	FY 2021
	32.000	-
	32.000	-
	32.000	-

Change Summary Explanation

FY20 funding decreased by 4.333M to cover SBIR adjustments.

FY22 Funding increased by 39.742M to continue development of M-Code/EAJ receivers to provide an enhanced anti-jam capability.

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force										Date: May 2021		
Appropriation/Budget Activity 3600 / 4					R-1 Program Element (Number/Name) PE 0604201F / PNT Resiliency, Mods, and Improvements				Project (Number/Name) 641030 / GPS Receiver Development			
COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
641030: GPS Receiver Development	-	120.267	0.000	39.742	0.000	39.742	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

This program, BA 4, PE 0604201F, project 641030, M-Code EAJ, is a new start.

A. Mission Description and Budget Item Justification

This munitions receiver development project includes development of a GPS M-code receiver with EAJ and analysis efforts. M-code receivers with EAJ provide advanced Positioning, Navigation, and Timing (PNT) capabilities required for weapons to operate in Adversarial Anti-access/Area Denial (A2/AD) environments. M-Code receivers with EAJ also provide increased accuracy, better signal acquisition, and advanced security.

M-code receivers with EAJ capability assures continued weapon system precision and lethality.

Fielding EAJ M-Code weapons requires research, development, qualification, testing, and mission planning of M-Code receivers across the weapons portfolio. This will include all systems, subsystems, software, fuzing, and support activities associated with the development and implementation of M-Code receivers.

This program element may include necessary emergent or unanticipated civilian pay expenses required to manage, execute, and deliver M-Code GPS receivers for emergent or unanticipated weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program elements 0605831F.

B. Accomplishments/Planned Programs (\$ in Millions)

Title: M-Code EAJ	FY 2020	FY 2021	FY 2022
Description: M-Code/EAJ receivers provide an enhanced anti-jam capability. M-Code/EAJ receivers provide the capability to operate in increasing adversarial A2/AD jamming environment. M-Code/EAJ receivers also provide increased accuracy, better signal acquisition, and advanced security.	88.267	0.000	39.742
FY 2021 Plans: N/A			
FY 2022 Plans:			

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0604201F / PNT Resiliency, Mods, and Improvements	Project (Number/Name) 641030 / GPS Receiver Development
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B. Accomplishments/Planned Programs (\$ in Millions)	FY 2020	FY 2021	FY 2022
Perform design and development of High Anti-Jam Miniature M-Code Enhanced Receiver (HAMMER), and support design of JASSM Anti-Jam GPS Receiver (JAGR) M-Code capability. FY 2021 to FY 2022 Increase/Decrease Statement: Funding increased to perform development of M-Code/EAJ receivers to provide an enhanced anti-jam capability across multiple munitions.			
Accomplishments/Planned Programs Subtotals	88.267	0.000	39.742

	FY 2020	FY 2021
Congressional Add: Program Increase - M-Code EAJ	32.000	-
FY 2020 Accomplishments: Funds M-Code GPS receiver development and testing for Strategic Anti-Jam Beamforming Receiver-Modernized (SABR-M) receiver prototype, the design and development of High Anti-Jam Miniature M-Code Enhanced Receiver (HAMMER), and support design of JASSM Anti-Jam GPS Receiver (JAGR) M-Code capability.		
Congressional Adds Subtotals	32.000	-

C. Other Program Funding Summary (\$ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
• RDTE 05 PE 0604329F, BPAC 655191: SDB Increment II	11.422	-	-	-	-	-	-	-	-	-	-
• RDTE 07 0207327F: Small Diameter Bomb (SDB)	-	11.313	7.768	-	7.768	-	-	-	-	-	-
• RDTE 04 PE 0604327F, BPAC 645341: Direct Strike Penetrators	-	2.150	-	-	-	-	-	-	-	-	-
• RDTE 05 0604618F: Joint Direct Attack Munition	-	6.806	-	-	-	-	-	-	-	-	-
• RDTE 07 0207325F: Joint Air-to-Surface Standoff Missile (JASSM)	-	-	3.000	-	3.000	-	-	-	-	-	-
• PAAF 01 0604327F: Hardened Target Munitions	-	-	15.500	-	15.500	-	-	-	-	-	-

Remarks

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0604201F / PNT Resiliency, Mods, and Improvements	Project (Number/Name) 641030 / GPS Receiver Development

D. Acquisition Strategy

M-Code/EAJ effort uses a Family of Systems (FoS) approach where the weapons prime contractors develop receivers capable of operating in any of their Air Force weapons. The receivers are based on a common, internally-developed Interface Requirements Specification (IRS), Technology Requirement Document (TRD), and threat scenarios. This approach uses a combination of contract types based on acquisition phase (Technology Maturation & Risk Reduction (TMRR), Development, Production) and risk. The weapons system program offices share a common development Program Element (PE) to allow flexibility in funding and planning, switching to individual PEs for receiver integration, operational testing, and production. The M-Code/EAJ weapons receiver development effort leverages technology currently under development by the Military GPS User Equipment (MGUE) program and will provide the warfighter with unmatched capability to operate in future A2/AD environments.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0604201F / PNT Resiliency, Mods, and Improvements	Project (Number/Name) 641030 / GPS Receiver Development
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Product Development (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Common Weapons M-Code Receiver Development (SDB II)	Various	Raytheon : Tucson, AZ	-	48.175	Nov 2019	-		20.354	Dec 2021	-		20.354	-	-	-
Common Weapons M-Code Receiver Development (CAAP ASIC)	MIPR	DMEA/Global Foundries : Hopewell Junction, NY	-	5.836	May 2020	-		4.273	Dec 2021	-		4.273	-	-	-
Common Weapons M-Code Receiver Development (JDAM/MOP/ SDB I Phase II)	Various	Boeing : St Louis, MO	-	18.775	Nov 2019	-		-		-		-	-	-	-
Common Weapons M-Code Receiver Development (AJ ASIC)	Various	Collins Aerospace : Cedar Rapids, IA	-	3.315	Feb 2020	-		-		-		-	-	-	-
Common Weapons M-Code Receiver Development (AJ ASIC/ MIPR)	Various	DMEA/Global Foundries : Hopewell Junction, NM	-	6.000	Nov 2019	-		-		-		-	-	-	-
Common Weapons M-Code Receiver Development (Pre-EMD JASSM)	Various	Lockheed Martin : Orlando, FL	-	3.000	Oct 2019	-		-		-		-	-	-	-
Common Weapons M-Code Receiver Development (JASSM C+ + Phase II)	Various	Lockheed Martin : Orlando, FL	-	20.287	Oct 2019	-		1.397		-		1.397	-	-	-
Common Weapons M-Code Receiver Development (JASSM MCU)	Various	Lockheed Martin : Orlando, FL	-	13.311	Nov 2019	-		2.313	Dec 2021	-		2.313	-	-	-
Common Weapons M-Code Receiver Development (JASSM JAGR)	Various	Lockheed Martin : Orlando, FL	-	-		-		9.605	Nov 2021	-		9.605	-	-	-

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Exhibit R-4, RDT&E Schedule Profile: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0604201F / PNT Resiliency, Mods, and Improvements	Project (Number/Name) 641030 / GPS Receiver Development

	FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

M-Code/EAJ Receivers	
M-Code/EAJ Research & Development	[REDACTED]
M-Code/EAJ Test and Qualification	[REDACTED]

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Exhibit R-4A, RDT&E Schedule Details: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0604201F / <i>PNT Resiliency, Mods, and Improvements</i>	Project (Number/Name) 641030 / <i>GPS Receiver Development</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>M-Code/EAJ Receivers</i>				
M-Code/EAJ Research & Development	1	2020	1	2023
M-Code/EAJ Test and Qualification	3	2020	1	2025

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 0604257F / <i>Advanced Technology and Sensors</i>
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COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
Total Program Element	-	23.145	24.702	23.745	0.000	23.745	-	-	-	-	-	-
644818: <i>Imaging and Targeting Support</i>	-	16.987	15.869	14.641	0.000	14.641	-	-	-	-	-	-
645148: <i>Common Airborne Sense and Avoid (C-ABSAA)</i>	-	6.158	8.833	9.104	0.000	9.104	-	-	-	-	-	-

Note

In FY2022, PE 0604257F (Advanced Technology and Sensors), Project 645148, (Common Airborne Sense and Avoid) funds were transferred to align funding with Air Force project priorities and requirements.

A. Mission Description and Budget Item Justification

The Advanced Technology and Sensors (ATS) program coordinates the development of advanced technologies (sensors, data links, targeting support, and quick reaction capabilities) in support of multiple airborne reconnaissance platforms, both manned and unmanned. Its objectives are to develop, demonstrate, and rapidly transition advanced, interoperable, multi-platform solutions to reduce the find, fix, target, and track kill chain timeline, and to provide safe separation and collision avoidance for remotely piloted aircraft. This program coordinates the development of common collection, processing, and dissemination solutions for near-real time intelligence, surveillance, and reconnaissance. The ATS program also increases interoperability by developing common standards and interfaces.

The funds in this program are distributed in priority order for the goal of building a comprehensive Geospatial Intelligence (GEOINT) capability for the USAF. On an annual basis, developmental technologies are reviewed against warfighter capabilities and requirements based on strategic roadmaps and on the results of the Airborne Sensors for ISR Analysis of Alternatives, as prefaced in the Challenging Targets Initial Capabilities Document. Efforts advancing the technological maturity of promising sensors and processing capabilities are reviewed and prioritized into a recommended list for senior executive direction to implement in the coming year. The program office has the ability to rapidly initiate an Imaging & Targeting Support (I&TS) project in order to expedite development and acquisition of urgently needed capabilities for the warfighter.

The Air Force is pursuing a software intensive approach to maintain safe separation, avoid collisions, and provide the ability to safely integrate with other airspace users. The software solutions identified in this Information System Capability Development Document (IS-CDD) are open and modular and accept inputs from any type of sensor or data link and will operate any legacy and future Group 4 and 5 RPA. The effort includes technology maturation, risk reduction, EMD and life-cycle costs, such as: 1) prototyping activities, 2) streamlined development, test and implementation of the software, 3) development of open system architecture using modular design, standards-based interfaces, and widely-supported consensus-based standards, and 4) collaboration with the Federal Aviation Agency (FAA), National Aeronautics and Space Administration (NASA), and other services to develop national policy and standards.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force	Date: May 2021
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Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 0604257F / <i>Advanced Technology and Sensors</i>
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Funds in any project can also cover activities to include studies and analysis to support both current program planning and execution and future program planning. This program element may include necessary civilian pay expenses required to manage, execute, and deliver technology and sensor capabilities. The use of such program funds would be in addition to the civilian pay expenses budgeted in program element 0605831F.

This effort is in Budget Activity 4, Advanced Component Development and Prototypes (ACD&P), because efforts are necessary to evaluate integrated technologies, representative modes or prototype systems in a high fidelity and realistic operating environment.

B. Program Change Summary (\$ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Previous President's Budget	23.145	24.747	60.729	0.000	60.729
Current President's Budget	23.145	24.702	23.745	0.000	23.745
Total Adjustments	0.000	-0.045	-36.984	0.000	-36.984
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	0.000	0.000			
• Other Adjustments	0.000	-0.045	-36.984	0.000	-36.984

Change Summary Explanation

In FY 2022, BPAC 645148, decrease of \$35.371M, funds reallocated for higher Air Force priorities.

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force										Date: May 2021		
Appropriation/Budget Activity 3600 / 4					R-1 Program Element (Number/Name) PE 0604257F / <i>Advanced Technology and Sensors</i>				Project (Number/Name) 644818 / <i>Imaging and Targeting Support</i>			
COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
644818: <i>Imaging and Targeting Support</i>	-	16.987	15.869	14.641	0.000	14.641	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The purpose of the I&TS project is to develop, mature, demonstrate, and rapidly transition next-generation, persistent, wide area surveillance and common imagery reconnaissance sensor capabilities (active and passive systems), including sensor data processing, for multiple airborne platforms, as well as sensor products to aid in rapid targeting (e.g., geolocation models, sensor-based exploitation tools, sensor networking capabilities).

Developmental efforts pursued include improved sensor performance, new and improved sensor capabilities and modes, new and/or unique modalities, and enabling technologies. Improved sensor performance includes but is not limited to: increased geolocation accuracy, increased dismount detection capability, and advanced sensor data correlation. New and improved sensor capabilities include but are not limited to: Hyperspectral Imagery (HSI), Polarimetric Imaging (PI), Ground and Dismount Moving target indicator (GMTI/ DMTI), maritime search/track, Inverse Synthetic Aperture Radar, Foliage Penetration (FOPEN), and nuclear event detection. New and improved sensor modes include but are not limited to: high resolution imagery, Ground and Dismount Moving Target Indicator (GMTI/DMTI), persistent surveillance, wide area motion imagery, and Spectral Identification. New and unique sensor modalities include but are not limited to: low frequency SAR, Hyperspectral Imagery (HSI), and Light Detection And Ranging (LIDAR). Enabling Technologies include but are not limited to: automated and assisted target detection/recognition, Artificial Intelligence (AI), Machine Learning (ML), network centric warfare, integrated multi-sensor capabilities to detect and identify obscured targets, TCPED (Tasking, Collection, Planning, Exploitation, and Dissemination) improvements related to sensors, automated registration, and imagery product quality assurance.

These efforts are intended to accelerate delivery of data from sensor to user for both target search and target engagement (kill-chain) activities. This project will also increase interoperability by developing and advancing common standards (e.g. Open Mission Systems (OMS), Sensor Open System Architecture (SOSA), Common Open Architecture Radar Programs (COARPS), Multi-INT Common Open Architecture Reconnaissance Program Standard (MI-COARPS), National Imagery Transmission Format, AgilePod and data reduction) and interfaces.

Activities also include studies and analysis to support both current program planning and execution and future program planning. This program element may include necessary civilian pay expenses required to manage, execute, and deliver technology and sensor capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program element 0605831F.

B. Accomplishments/Planned Programs (\$ in Millions)

	FY 2020	FY 2021	FY 2022
Title: Imaging & Targeting Support (I&TS)	16.987	15.869	14.641

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0604257F / <i>Advanced Technology and Sensors</i>	Project (Number/Name) 644818 / <i>Imaging and Targeting Support</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2020	FY 2021	FY 2022
<p>Description: Corporately prioritized Air Force Multi-INT Portfolio of projects to develop and demonstrate next generation airborne sensors and processing technologies to further the art of the possible and/or transition ISR capabilities (ex: radar improvement, next-generation HSI, LIDAR, ISR Standards, EO/IR, and data mitigation technologies).</p> <p>FY 2021 Plans: Continue to develop, modernize, and demonstrate lower TRL projects into transition ready efforts. The following FY20 efforts will continue into FY21: - Common Open Architecture Radar Programs (COARPs) Compliant Detection Removal and Characterization (DRACO) - Automated imagery exploitation (EO Deep Learning) - Aether Spy - Multi-INT ATR for Geospatial Intelligence Capabilities (MAGIC)</p> <p>These efforts and following new and other projects approved through the GEOINT Capabilities Working Group (GCWG) Executive Element process. - Multi-INT Object-level Targeting Imagery Fusion-engine (MOTIF) - Autonomous Multi-IMINT Adaptive Tasking Engine (AUTOMATE) - H-Chip Mid Altitude Risk Reduction - MI-COARPS Processor for Real-Time Embedded Performance (MICPREP) - Real Time Turbulence Mitigation</p> <p>FY 2022 Plans: Will continue to develop, modernize, and demonstrate lower TRL projects into transition ready efforts. The following FY21 efforts will continue into FY22: - Multi-INT Object-level Targeting Imagery Fusion-engine (MOTIF) - Autonomous Multi-IMINT Adaptive Tasking Engine (AUTOMATE) - MI-COARPS Processor for Real-Time Embedded Performance (MICPREP) - Real Time Turbulence Mitigation</p> <p>These efforts and new proposed projects will be approved through the GEOINT Capabilities Working Group (GCWG) Executive Element process. Efforts are approved in the summer prior to the start of the new fiscal year.</p> <p>FY 2021 to FY 2022 Increase/Decrease Statement: Decrease of funding from FY2021 to FY2022 to support higher Air Force priorities.</p>			
Accomplishments/Planned Programs Subtotals	16.987	15.869	14.641

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0604257F / <i>Advanced Technology and Sensors</i>	Project (Number/Name) 644818 / <i>Imaging and Targeting Support</i>

C. Other Program Funding Summary (\$ in Millions)

N/A

Remarks

D. Acquisition Strategy

Imaging and Targeting Support efforts are prioritized on an annual basis by the GCWG, in accordance with the validated gaps in the Challenging Targets Initial Capabilities Document. Resulting funded efforts are then contracted for and/or executed by either various program offices, laboratories, industry, and/or other government agencies.

Acquisition strategy is to maximize commercial and national development efforts and investment through multiple contracting methods, including the use of Engineering Change Proposals to modify existing contracts and new contracts that were awarded both competitively or on a sole source basis.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0604257F / <i>Advanced Technology and Sensors</i>	Project (Number/Name) 644818 / <i>Imaging and Targeting Support</i>
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Product Development (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
SHERLOC	SS/CPFF	Collins : Westford, MA	-	0.691	Jul 2020	0.018	May 2021	-		-		-	-	-	-
H-Chip	SS/CPFF	EO Vista : Acton, MA	-	2.944	Apr 2020	1.895	Dec 2020	-		-		-	-	-	-
Predator/Reaper Off-board Sensing and Improved Targeting (PROSIT)	SS/CPFF	Various : Various, OH	-	0.854	Feb 2020	0.047	May 2021	-		-		-	-	-	-
AgilePOD	SS/CPFF	Various : Various	-	3.347	Aug 2020	4.222	May 2021	-		-		-	-	-	-
Multi-ATR	SS/CPFF	BAE : Durham, NC	-	2.040	Feb 2020	-		-		-		-	-	-	-
COARPS Compliant Detection Removal and Characterization (DRACO)	SS/CPFF	Lockheed Martin : Goodyear, AZ	-	1.250	Jun 2020	1.199	Jun 2021	-		-		-	-	-	-
Automated Electro-Optical Mobile Target Classification Deep Learning	SS/CPFF	Ball Aerospace : Dayton, OH	-	1.800	Jun 2020	2.640	Feb 2021	-		-		-	-	-	-
Aether Spy	SS/CPFF	Various : Various	-	2.845	Apr 2020	-		-		-		-	-	-	-
Cerberus	SS/CPFF	Raytheon : McKinney, TX	-	0.394	Mar 2020	-		-		-		-	-	-	-
KeyRadar	SS/CPFF	Jacobs Technology : Beavercreek, OH	-	0.350	Jun 2020	-		-		-		-	-	-	-
MOTIF	SS/CPFF	SRI : Ann Arbor, MN	-	-		1.300	Jan 2021	0.902	Dec 2021	-		0.902	-	-	-
Real Time Turbulence Mitigation	SS/CPFF	Centauri : Chantilly, VA	-	-		0.580	Feb 2021	0.850	Dec 2021	-		0.850	-	-	-
AUTOMATE	SS/CPFF	SRI : Ann Arbor, MN	-	-		0.800	Mar 2021	0.629	Dec 2021	-		0.629	-	-	-
MICPREP	SS/CPFF	General Dynamics : Bloomington, MN	-	-		1.950	Jan 2021	1.950	Dec 2021	-		1.950	-	-	-
New FY22 Technology Efforts (Prioritized by GCWG)	Various	Various : Various	-	-		-		8.509	Jan 2022	-		8.509	-	-	-
Subtotal			-	16.515		14.651		12.840		-		12.840	-	-	N/A

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Exhibit R-4A, RDT&E Schedule Details: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0604257F / <i>Advanced Technology and Sensors</i>	Project (Number/Name) 644818 / <i>Imaging and Targeting Support</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>Imaging and Targeting Support</i>				
H-Chip	1	2021	1	2022
Predator/Reaper Offboard Sensing and Improved Targeting (PROSIT)	1	2020	2	2021
SUAS Tactical Agile Gimbal (STAG) (MSGPLS 5" Gimbal Laser)	1	2020	1	2021
Multi-ATR	2	2020	4	2021
COARPS Compliant DRACO	3	2020	1	2022
Automated E/O Target Deep Learning	3	2020	2	2022
Aether Spy	3	2020	4	2022
AgilePod	4	2021	4	2022
MOTIF	2	2021	4	2022
Real Time Turbulence Mitigation	2	2021	2	2022
AUTOMATE	2	2021	4	2022
MICPREP	2	2021	1	2022
GCWG Technology Efforts	2	2022	4	2022

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force										Date: May 2021		
Appropriation/Budget Activity 3600 / 4					R-1 Program Element (Number/Name) PE 0604257F / <i>Advanced Technology and Sensors</i>				Project (Number/Name) 645148 / <i>Common Airborne Sense and Avoid (C-ABSAA)</i>			
COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
645148: <i>Common Airborne Sense and Avoid (C-ABSAA)</i>	-	6.158	8.833	9.104	0.000	9.104	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Common-Airborne Sense and Avoid (C-ABSAA) project provides Group 4 and 5 Remotely Piloted Aircraft (RPA) with the ability to safely and effectively operate in all classes of airspace worldwide. The C-ABSAA project acts as a replacement for the sense and avoid capability of the pilot on board a manned aircraft.

The Air Force is pursuing a software intensive approach to maintain safe separation, avoid collisions, and provide the ability to safely integrate with other airspace users. The software solutions identified in this Information System Capability Development Document (IS-CDD) are open and modular and accept inputs from any type of sensor or data link and will operate any legacy and future Group 4 and 5 RPA. The effort includes technology maturation, risk reduction, and software processes and initiatives, such as: 1) prototyping activities, 2) system integration, test and implementation of software, 3) development of open system architecture using modular design, standards-based interfaces, and widely-supported consensus-based standards, 4) development of model based system engineering processes, standards and documentation and, 5) collaboration with the Federal Aviation Agency (FAA), National Aeronautics and Space Administration (NASA), and other services to develop national policy and standards.

The program element may include necessary civilian pay expenses required to manage, execute, and deliver technology and sensor capabilities. The use of such program funds would be in addition to the civilian pay expenses budgeted in program element 0605831F.

B. Accomplishments/Planned Programs (\$ in Millions)

	FY 2020	FY 2021	FY 2022
Title: Sense and Avoid (SAA)-Related Activities	6.158	8.833	9.104
Description: Conduct risk reduction and prototyping activities to improve affordability, reduce cost, schedule and technical risk entering next milestone.			
Received Joint Staff approval of Information Systems CDD requirements. C-ABSAA uses an iterative and incremental approach to design, code, integrate, test and implement high quality software in a cost effective and timely manner. The software utilizes Open System Architecture (OSA) design, COTS, Application Programming Interfaces (APIs), and maximum software and interface module independence. Program will also develop and certify Government simulation tools and equipment.			
FY 2021 Plans:			
- Completion of RPA sense and avoid (C-ABSAA) Technology Maturation & Risk Reduction phase			
- Generate and complete technical data package			

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force		Date: May 2021		
Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0604257F / <i>Advanced Technology and Sensors</i>	Project (Number/Name) 645148 / <i>Common Airborne Sense and Avoid (C-ABSAA)</i>		
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2020	FY 2021	FY 2022
<ul style="list-style-type: none"> - Generate documentation required for Milestone B - Collaborate with FAA, NASA, and other Services and agencies on national policy and standards - Develop, test, and certify within C-ABSAA Systems Integration Lab open modular architecture processes, standards and design <p>FY 2022 Plans: FY 2022 Plans:</p> <ul style="list-style-type: none"> - Will complete and close remaining C-ABSAA Technology Maturation & Risk Reduction actions to posture for future efforts - Will complete review and acceptance of Technical Data Package - Will allocate remaining funds to expedite existing projects or start new projects within the Advanced Technology & Sensors program under the Imaging and Targeting Support project <p>FY 2021 to FY 2022 Increase/Decrease Statement: Increase to support follow-on C-ABSAA Technology Maturation & Risk Reduction Phase and continued collaboration.</p>				
Accomplishments/Planned Programs Subtotals		6.158	8.833	9.104
C. Other Program Funding Summary (\$ in Millions)				
N/A				
Remarks				
D. Acquisition Strategy				
Contract will be competitively awarded.				

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Exhibit R-4, RDT&E Schedule Profile: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0604257F / <i>Advanced Technology and Sensors</i>	Project (Number/Name) 645148 / <i>Common Airborne Sense and Avoid (C-ABSAA)</i>

	FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

<i>Common-Airborne Sense and Avoid</i>																												
Technology Maturation and Risk Reduction	██████████																											
Technical Data Package	██████████																											
TMRR Follow-on																												

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Exhibit R-4A, RDT&E Schedule Details: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0604257F / <i>Advanced Technology and Sensors</i>	Project (Number/Name) 645148 / <i>Common Airborne Sense and Avoid (C-ABSAA)</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>Common-Airborne Sense and Avoid</i>				
Technology Maturation and Risk Reduction	1	2020	2	2021
Technical Data Package	1	2020	2	2021
TMRR Follow-on	2	2021	4	2022

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 0604288F / <i>Survivable Airborne Operations Center</i>
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COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
Total Program Element	-	12.205	59.390	133.253	0.000	133.253	-	-	-	-	-	-
646507: <i>Survivable Airborne Operations Center (SAOC)</i>	-	12.205	59.390	133.253	0.000	133.253	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-	-	-

Note
In FY2018, PE 0302015F, E-4B National Airborne Operations Center (NAOC) Project 674777, E-4B Aircraft Modernization efforts were transferred to PE 0604288F, National Airborne Ops Center (NAOC) Recap, Project 646507, NAOC Recap Development, in order to provide greater transparency and consolidate efforts. NAOC Recap Development funding in FY18 was \$6.14M and FY19 was \$7.17M.

A. Mission Description and Budget Item Justification

The Survivable Airborne Operations Center (SAOC), formerly known as the E-4B National Airborne Operations Center (NAOC) Recapitalization effort, will replace the aging E-4B fleet which faces capability gaps, diminishing manufacturing sources, increased maintenance costs, and parts obsolescence as it approaches the end of its serviceable life. The recapitalization effort will be informed by Air Force and Department of Defense analyses used to determine a holistic approach to replacing the aging E-4B fleet and capabilities of other nuclear and national command and control mission sets.

SAOC will be a survivable node of the National Military Command System (NMCS), providing POTUS, SECDEF and the CJCS a worldwide, survivable, and enduring node of the NMCS to fulfill national security requirements throughout all stages of conflict. As a command, control and communications center directing US forces, executing emergency war orders and coordinating the activities of civil authorities including national contingency plans, this capability ensures continuity of operations plans and continuity of government as required in a national emergency or after negation/destruction of ground command and control centers.

SAOC will fulfill the requirements of the AF Nuclear Mission by providing Nuclear Command, Control and Communications (NC3) capabilities to execute Nuclear Command and Control (NC2) Concept of Operations (CONOPS) that enable the exercise of authority and direction by the President to command and control US military nuclear weapon operations.

The SAOC baseline operational missions also include Secretary of Defense Global Command and Control (SDGC2), enabling the SecDef to execute command and control responsibilities around the globe, as well as support to Defense Support of Civil Authority (DSCA) providing DoD support to civilian agencies to support emergencies or disasters relief efforts when requested by the Department of Homeland Security and approved by the SecDef or Chairman contingent on platform availability.

In FY2019, OSD CAPE initiated a joint service Analysis of Alternatives (AoA) to assess mission sets and platforms across E-4B (NAOC), C-32A (Executive Airlift), and the Navy's E-6B (ABNCP/TACAMO), known as the "NEAT" AoA. The NEAT AoA is complete and OSD CAPE approved and signed the Sufficiency Review on 30 Nov 2020.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force	Date: May 2021
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Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 0604288F / <i>Survivable Airborne Operations Center</i>
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Furthermore, program funds include funding for emerging requirements to support program office operations, management services (Federally Funded Research and Development Services [FFRDC], Advisory and Assistance Services [A&AS], etc.), Program Management Support (PMS), security, prototyping, equipment and other efforts as required to stand up a program office. Finally, it includes all activities required to award and execute design and prototyping contracts to either a single or multiple vendors; to include provisioning for follow on efforts, such as life-of-type buys and long lead materials for following activities and options.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver weapon system capability. The use of such programs funds would be in addition to the civilian pay expenses budgeted in program element 0605831F. In FY20 \$0M was expended for civilian pay expenses in this program element, and in FY21 \$0.016M is forecasted for civilian pay expenses in this program element.

This effort is in Budget Activity 4, Advanced Component Development and Prototypes (ACD&P), because efforts are necessary to evaluate integrated technologies, representative modes or prototype systems in a high fidelity and realistic operating environment.

B. Program Change Summary (\$ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Previous President's Budget	12.669	76.417	136.477	0.000	136.477
Current President's Budget	12.205	59.390	133.253	0.000	133.253
Total Adjustments	-0.464	-17.027	-3.224	0.000	-3.224
• Congressional General Reductions	0.000	-0.108			
• Congressional Directed Reductions	0.000	-16.919			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	-0.464	0.000			
• Other Adjustments	0.000	0.000	-3.224	0.000	-3.224

Change Summary Explanation

FY2021 adjustments include Congressional mark for Management services unjustified growth -2,635; Acquisition strategy -14,284 and Undistributed Reduction - Excess to Need -108

C. Accomplishments/Planned Programs (\$ in Millions)	FY 2020	FY 2021	FY 2022
Title: SAOC	12.205	59.390	133.253
Description: The SAOC weapon system will be comprised of a Commercial Derivative Aircraft (CDA), mission system, and ground support systems. The CDA will be hardened to protect against nuclear and electromagnetic effects and modified with an aerial refueling capability to enable sustained airborne operations. The mission system will integrate secure communications and			

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force		Date: May 2021		
Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>		R-1 Program Element (Number/Name) PE 0604288F / <i>Survivable Airborne Operations Center</i>		
C. Accomplishments/Planned Programs (\$ in Millions)		FY 2020	FY 2021	FY 2022
<p>planning capabilities on modern information technology (IT) infrastructure using a modular open system architecture. The ground systems include aircrew and maintenance training systems, ground support equipment, mission system laboratories, and other ground systems to enable the operations, sustainment, and future modifications of the SAOC weapon system across the lifecycle.</p> <p>FY 2021 Plans:</p> <ul style="list-style-type: none"> -Complete the NEAT AoA and continue to support Air Force Global Strike Command (AFGSC) with Capability Development Document (CDD) generation and joint approval. -Continue development of the System Requirements Document (SRD). -Conduct industry-supported market research in support of acquisition strategy finalization, development of request for proposals (RFP), and support documentation development for milestone decisions. -Conduct planning, prototyping, and acquisition activities with industry that are required for integration of NC3 systems, directed systems, communications systems, Advanced Battle Management System (ABMS), and mission system laboratories. -Support development of needed next generation capabilities and/or modernization of existing systems toward enterprise interfaces, open standards, and platform agnostic architectures. -Accelerate readiness for SAOC system development by conducting used aircraft research and analysis, identification and capture of aircraft, digital modeling and engineering analysis, and establishment of a digital engineering framework. -Conduct activities to integrate Modular Open Systems Architecture throughout the SAOC program and support the development and transition to open system architecture for required legacy systems and future capabilities. -Continue the program office manning growth-path required to support the execution of a future Major Defense Acquisition Program (MDAP). <p>FY 2022 Plans:</p> <ul style="list-style-type: none"> -Complete development of the System Requirements Document (SRD). -Continue industry-supported market research to support development Request for Proposal (RFP) release and documentation development for milestone decisions. -Expand planning, prototyping, and acquisition activities with industry that are required for integration of or in support of NC3 systems, directed systems, communications systems, Advanced Battle Management System (ABMS), mission system laboratories, or other EMD assets/hardware. -Support development of needed next generation capabilities and/or modernization of existing systems toward enterprise interfaces, open standards, and platform agnostic architectures. -Conduct mitigation activities for diminishing manufacturing issues, impacting mission systems to avoid upgrade/redesign expense. -Continue activity for used aircraft research and analysis, identification and capture of aircraft, digital modeling, and establishment of a digital engineering framework. 				

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force	Date: May 2021
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Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 0604288F / <i>Survivable Airborne Operations Center</i>
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C. Accomplishments/Planned Programs (\$ in Millions)	FY 2020	FY 2021	FY 2022
<ul style="list-style-type: none"> -Investigate and inspect candidate test articles. -Continue to integrate Modular Open Systems Architecture throughout the SAOC program and support the development and transition to open system architecture for required legacy systems and future capabilities. -Continue the program office manning growth-path required to support the SAOC system development. <p><i>FY 2021 to FY 2022 Increase/Decrease Statement:</i></p> <ul style="list-style-type: none"> -The FY22 increase from FY21 is required to accelerate Pre-EMD activities needed to prepare for and position the program for Milestone B and EMD execution in early FY23. -Funding supports expansion of integrated digital environments, model-based systems engineering efforts with industry, and further FY21 contracted activities to improve lead times, minimize risk, and/or enhance interoperability. -Increased funds expand support to emerging subsystem capability development and support modernization and acquisition of existing systems needed for integration into SAOC's mission system. -Finally, funding increase is required for additional civilian pay expenses in support of stand-up of the program office. 			
Accomplishments/Planned Programs Subtotals	12.205	59.390	133.253

D. Other Program Funding Summary (\$ in Millions)

N/A

Remarks

E. Acquisition Strategy

Based on NEAT AoA findings and CDD required capabilities, the SAOC program is pursuing an accelerated market research phase to update the 2020 acquisition strategy and rapidly pursue system development. The program is striving to maintain a full and open competitive acquisition and maximize competition across the entire weapon system lifecycle. In parallel, the program is supporting AFGSC as they complete the requirements validation process.

OSD formally designated the SAOC program an ACAT ID on 30 Aug 20. Through multiple engagements with the Milestone Decision Authority, the program is targeting finalization of the acquisition strategy in FY21 to enter the acquisition lifecycle at Milestone B with Request for Proposal release targeted for early FY22.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Air Force												Date: May 2021			
Appropriation/Budget Activity				R-1 Program Element (Number/Name)				Project (Number/Name)							
3600 / 4				PE 0604288F / Survivable Airborne Operations Center				646507 / Survivable Airborne Operations Center (SAOC)							
Product Development (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Pre-EMD Contract Activities/Studies	C/Various	TBD : TBD	-	-		30.740	Apr 2021	91.541	Apr 2022	-		91.541	-	-	-
Subtotal			-	-	30.740		91.541		-		91.541	-	-	N/A	
Support (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Direct Mission Support	C/Various	Various : Bedford, MA : TBD	-	0.971	Feb 2020	11.328	Oct 2020	4.522	Oct 2021	-		4.522	-	-	-
Subtotal			-	0.971		11.328		4.522		-		4.522	-	-	N/A
Test and Evaluation (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Test and Evaluation	C/CPIF	Not specified. : TBD	-	-		0.000		3.745	Oct 2021	-		3.745	-	-	-
Subtotal			-	-	0.000		3.745		-		3.745	-	-	N/A	
Management Services (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
FFRDC	SS/CPFF	Various : Bedford, MA : Hanscom AFB, MA	-	6.932	Oct 2019	6.295	Oct 2020	15.170	Oct 2021	-		15.170	-	-	-
EPASS (A&AS)	C/CPFF	Various : Bedford, MA : Hanscom AFB, MA	-	2.869	Jul 2020	7.093	Jul 2021	10.052	Jul 2022	-		10.052	-	-	-

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0604288F / <i>Survivable Airborne Operations Center</i>	Project (Number/Name) 646507 / <i>Survivable Airborne Operations Center (SAOC)</i>
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Management Services (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
PMA - Other	Various	Various : Bedford, MA : Hanscom AFB, MA	-	1.433	Oct 2019	3.934	Oct 2020	8.223	Oct 2021	-		8.223	-	-	-
Subtotal			-	11.234		17.322		33.445		-		33.445	-	-	N/A
Project Cost Totals			-	12.205		59.390		133.253		-		133.253	-	-	N/A

Remarks

Product Development:
 -Increase in FY22 Pre-EMD Contract Activities and Studies from FY21 accelerates pre-EMD activities by investing in necessary product development to prepare program for Milestone B and EMD execution in early FY23.

Support:
 -Increase in FY21 Direct Mission Support investment from FY20 establishes required digital engineering tools and secure facilities for implementation of the program.
 -FY22 Direct Mission Support continues implementation of digital engineering tool infrastructure and efforts.

Management Services:
 -Increase in FY22 FFRDC and EPASS (A&AS) is required to accelerate pre-EMD activities and prepare the program for Milestone B and EMD execution in early FY23.

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Exhibit R-4A, RDT&E Schedule Details: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0604288F / <i>Survivable Airborne Operations Center</i>	Project (Number/Name) 646507 / <i>Survivable Airborne Operations Center (SAOC)</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>Survivable Airborne Operations Center Development</i>				
Analysis of Alternatives	1	2020	1	2021
Acquisition Strategy Development	1	2020	4	2021
Pre-EMD Contract Activities, Studies & Prototyping	3	2020	2	2023
Milestone B	1	2023	2	2023
EMD	2	2023	4	2026

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 0604317F / <i>Technology Transfer</i>
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COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
Total Program Element	-	37.269	16.980	15.768	0.000	15.768	-	-	-	-	-	-
646003: <i>Partnership Intermediary Agreement(s)</i>	-	17.096	16.980	1.000	0.000	1.000	-	-	-	-	-	-
646030: <i>AFwerX</i>	-	20.173	0.000	14.768	0.000	14.768	-	-	-	-	-	-

A. Mission Description and Budget Item Justification

Technology Transfer is a critical strategy for the NDS and DoD that makes the best possible use of national scientific, technical resources and information to enhance the effectiveness of DoD forces and warfighting capability systems. The Air Force Technology Transfer program oversees all Air Force inventions/patents and technology transfer agreements.

In FY 2012, DoD devolved management of OSD sponsored Partnership Intermediaries (PIAs) to the Air Force (AF). The Air Force Technology Transfer & Transition Office manages the Montana State University's TechLink & MilTech PIAs as well as AF PIAs. TechLink brokered 70% of DoD licenses over the past 10 years. The 646003 project includes the management of DoD/AF PIAs, Federal Lab Consortium Fees, invention disclosure & patent fees, information management data base, travel, training, outreach and tech scouting events. This program impacts virtually all technology fields, including medical, software, electronics, communications, advanced materials, energy-related technologies, and more. This effort support our mission to innovate and modernize DoD weapon systems through collaborative teamwork and strategic partnerships.

The AFWERX mission is to transition agile, affordable, and accelerated capabilities by teaming commercial technology developers with Airmen and Guardian talent. AFWERX leverages Spark (the Airmen and Guardian talent base), AFVentures (the dual-use expanded technology base), and Prime to scale and accelerate the capability. Funding in this project supports AFWERX research and development, non-SBIR/STTR civilian personnel pay, innovation hubs, and non-SBIR/STTR information technology, public affairs, and marketing. The Spark mission is to expand and empower the network of Airmen and Guardian talent that is ready, willing, and able to enhance capability developed with a culture of innovation. AFWERX uses Spark to discover and translate innovative talent into executable projects by facilitating stakeholder alignment through workshops and challenges. This inspires and ignites creativity as well as creates a bridge to the small business ecosystem reached through the SBIR/STTR program. This connection brings together the creativity, innovation, and entrepreneurial spirit of small businesses and our Airmen and Guardians to solve Air and Space Force technology and capability gaps.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver Technology Transfer capabilities. The use of such program funds would be in addition to the civilian pay expenses budgeted in program element 0605831F.

In FY 2022, all efforts and civilian manpower under project 646030, AFWERX, were realigned from the Air Force Operations and Maintenance (O&M) appropriation, Budget Activity (BA-04), to now use Research, Development, Test, and Evaluation funds.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 0604317F / <i>Technology Transfer</i>
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This effort is in Budget Activity 4, Advanced Component Development and Prototypes (ACD&P), because efforts are necessary to evaluate integrated technologies, representative modes or prototype systems in a high fidelity and realistic operating environment.

B. Program Change Summary (\$ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Previous President's Budget	37.614	3.011	3.218	0.000	3.218
Current President's Budget	37.269	16.980	15.768	0.000	15.768
Total Adjustments	-0.345	13.969	12.550	0.000	12.550
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	0.000	0.000			
• Other Adjustments	-0.345	13.969	12.550	0.000	12.550

Congressional Add Details (\$ in Millions, and Includes General Reductions)

Project: 646003: *Partnership Intermediary Agreement(s)*

Congressional Add: *Program Increase - technology partnerships*

Congressional Add: *Program increase - academic partnership intermediary agreement tech transfer*

Congressional Add Subtotals for Project: 646003

Congressional Add Totals for all Projects

	FY 2020	FY 2021
	4.000	4.000
	10.000	10.000
Congressional Add Subtotals for Project: 646003	14.000	14.000
Congressional Add Totals for all Projects	14.000	14.000

Change Summary Explanation

1) Increase in FY 2021 of 14 million due to congressional add in project 646003.

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force										Date: May 2021		
Appropriation/Budget Activity 3600 / 4					R-1 Program Element (Number/Name) PE 0604317F / <i>Technology Transfer</i>				Project (Number/Name) 646003 / <i>Partnership Intermediary Agreement(s)</i>			
COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
646003: <i>Partnership Intermediary Agreement(s)</i>	-	17.096	16.980	1.000	0.000	1.000	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

In FY 2012, DoD devolved management of OSD sponsored Partnership Intermediaries (PIs) to the Air Force (AF). The Air Force Technology Transfer & Transition Office manages the Montana State University's TechLink & MilTech Partnership Intermediary Agreements (PIAs) as well as Air Force Partnership Intermediary Agreements (PIAs). TechLink brokered 70% of DoD licenses over the past 10 years. Technology Transfer is a critical strategy for the National Defense Strategy and DoD that makes the best possible use of national scientific, technical resources and information to enhance the effectiveness of DoD forces and warfighting capability systems. The Air Force Technology Transfer program oversees all AF inventions/patents and technology transfer agreements. This project includes the management of DoD/AF PIAs, Federal Lab Consortium Fees, invention disclosure & patent fees, information management data base, travel, training, outreach and tech scouting events. This program impacts virtually all technology fields, including medical, software, electronics, communications, advanced materials, energy-related technologies, and more. This effort support our mission to innovate and modernize DoD weapon systems through collaborative teamwork and strategic partnerships.

B. Accomplishments/Planned Programs (\$ in Millions)

	FY 2020	FY 2021	FY 2022
Title: Technology Transfer	3.096	2.980	1.000
Description: Enhance and expand transfer of technologies between DoD and the commercial sector.			
FY 2021 Plans: Evaluate and market DoD laboratory inventions and broker license and other technology transfer agreements/ CRADAs between DoD research labs and U.S. companies to support the U.S. defense mission and benefit the U.S. economy. Implement new cost-effective approaches to increase and accelerate transfer of DoD lab technologies and facilitate their transition to DoD operational use. This effort will focus primarily on the non-traditional defense industrial base and is intended to leverage the innovativeness, resources, and capabilities of the private-sector in developing and commercializing new dual-use products and services.			
FY 2022 Plans: Continue to implement new cost-effective approaches to further increase and accelerate transfer of technologies developed at DoD laboratories and facilitate their transition to the warfighter. Evaluate and market DoD laboratory inventions and broker technology transfer agreements/Cooperative Research and Development Agreements (CRADAs), to include commercial licenses, that will support the US defense mission and benefit the US economy. Engage the innovative capabilities of non-traditional defense contractors in developing and commercializing new dual-use products and services.			
FY 2021 to FY 2022 Increase/Decrease Statement:			

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0604317F / <i>Technology Transfer</i>	Project (Number/Name) 646003 / <i>Partnership Intermediary Agreement(s)</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2020	FY 2021	FY 2022
The FY 2022 funding request was decreased by \$1.980 million due to higher DoD priorities.			
Accomplishments/Planned Programs Subtotals	3.096	2.980	1.000

	FY 2020	FY 2021
Congressional Add: Program Increase - technology partnerships <i>FY 2020 Accomplishments:</i> Conduct Congressionally directed efforts. <i>FY 2021 Plans:</i> Conduct Congressionally directed effort	4.000	4.000
Congressional Add: Program increase - academic partnership intermediary agreement tech transfer <i>FY 2020 Accomplishments:</i> Conduct Congressionally directed efforts. <i>FY 2021 Plans:</i> Conduct Congressionally directed effort	10.000	10.000
Congressional Adds Subtotals	14.000	14.000

C. Other Program Funding Summary (\$ in Millions)

N/A

Remarks

N/A

D. Acquisition Strategy

This effort uses a Partnership Intermediary Agreement (PIA) with TechLink at Montana State University. Through this agreement TechLink helps the Department of Defense to establish licensing and other technology transfer agreements with US industry. The effort is run through the Air Force Research Laboratory/Small Business office at Wright Patterson Air Force Base.

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Exhibit R-4A, RDT&E Schedule Details: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0604317F / <i>Technology Transfer</i>	Project (Number/Name) 646003 / <i>Partnership Intermediary Agreement(s)</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>Partnership Intermediary</i>				
Tech Transfer Partnership Intermediary	1	2020	4	2026
Congressional Add - technology partnerships	1	2020	4	2020
Congressional Add - academic partnership intermediary agreement tech transfer	1	2020	4	2020

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force										Date: May 2021		
Appropriation/Budget Activity 3600 / 4					R-1 Program Element (Number/Name) PE 0604317F / <i>Technology Transfer</i>				Project (Number/Name) 646030 / <i>AFwerX</i>			
COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
646030: <i>AFwerX</i>	-	20.173	0.000	14.768	0.000	14.768	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The AFWERX mission is to transition agile, affordable, and accelerated capabilities by teaming commercial technology developers with Airmen and Guardian talent. AFWERX leverages Spark (the Airmen and Guardian talent base), AFVentures (the dual-use expanded technology base), and Prime to scale and accelerate the capability. Funding in this project supports AFWERX research and development, non-Small Business Innovation Research/ Small Business Technology Transfer (SBIR/ STTR) civilian personnel pay, innovation hubs, and non-SBIR/STTR information technology, public affairs, and marketing. The Spark mission is to expand and empower the network of Airmen and Guardian talent that is ready, willing, and able to enhance capability developed with a culture of innovation. AFWERX uses Spark to discover and translate innovative talent into executable projects by facilitating stakeholder alignment through workshops and challenges. This inspires and ignites creativity as well as creates a bridge to the small business ecosystem reached through the SBIR/STTR program. This connection brings together the creativity, innovation, and entrepreneurial spirit of small businesses and our Airmen and Guardians to solve Air and Space Force technology and capability gaps.

In FY 2022, all efforts and civilian manpower under Project 646030, AFWERX, were transferred from the Air Force Operations and Maintenance (O&M) appropriation, Budget Activity (BA-04), to now use Research, Development, Test, and Evaluation funds for proper execution of AFWERX activities.

B. Accomplishments/Planned Programs (\$ in Millions)

	FY 2020	FY 2021	FY 2022
Title: AFWERX	20.173	0.000	14.768
Description: Transition affordable, and accelerated capabilities by teaming commercial technology developers with Airmen and Guardian talent.			
FY 2021 Plans: N/A			
FY 2022 Plans: Continue to drive capability development and technology transition through AFWERX core activities supporting all divisions: Innovation Hubs enable seamless connections with and among industry, academia and government personnel; Products and Training provide Airmen/Guardian innovators with the mindset, experience, and tools they need to effectively transition solutions to the field at scale; Innovation Facilitation enhances innovation outcomes by guiding Airmen/Guardians through critical elements of effective innovation (proper problem scoping, program design, stakeholder alignment, industry outreach, etc.) and transition funding supports development of high-impact technology solutions. Also to develop/sustain the Acquisition Workforce.			
FY 2021 to FY 2022 Increase/Decrease Statement:			

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force	Date: May 2021
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Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0604317F / <i>Technology Transfer</i>	Project (Number/Name) 646030 / <i>AFwerX</i>
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B. Accomplishments/Planned Programs (\$ in Millions)	FY 2020	FY 2021	FY 2022
Increase in FY 2022 of \$14.768 million due to realignment of AFWERX funding from O&M to RDT&E.			
Accomplishments/Planned Programs Subtotals	20.173	0.000	14.768

C. Other Program Funding Summary (\$ in Millions)

N/A

Remarks

D. Acquisition Strategy

The Innovation Hubs, Products and Training, and Innovation Facilitation are awarded through a combination of Partnership Intermediary Agreements and competitive contract vehicles, some of which are directly awarded by AFWERX and others are executed through federal partnerships as appropriate.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0604317F / <i>Technology Transfer</i>	Project (Number/Name) 646030 / <i>AFwerX</i>
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Product Development (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Innovation Hub (Collaboration Space, Operations)	PO	DefenseWerx : Ft Walton Beach, FL	-	7.955	Jan 2020	-		3.100		-		3.100	-	-	-
Facilitation (Challenges, Workshops & Events)	PO	VA Tech Applied Res Corp : Arlington, VA	-	5.525	Jan 2020	-		2.200		-		2.200	-	-	-
Prototype & Transition	MIPR	Capital-Factory : Austin, TX	-	0.500	Jan 2020	-		0.700		-		0.700	-	-	-
Product Development and Tools & Training	Various	All AFWERX locations : TBD	-	5.600	Jan 2020	-		3.200		-		3.200	-	-	-
Subtotal			-	19.580		-		9.200		-		9.200	-	-	N/A

Remarks
In FY 2022, all efforts and civilian manpower under Project 646030, AFWERX, were realigned from the Air Force Operations and Maintenance (O&M) appropriation, Budget Activity (BA-04), to now use Research, Development, Test, and Evaluation funds.

Management Services (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Acquisition workforce	Allot	HQ Air Force : Arlington, VA	-	0.593	Oct 2019	-		5.568		-		5.568	-	-	-
Subtotal			-	0.593		-		5.568		-		5.568	-	-	N/A

Remarks
In FY 2022, all efforts and civilian manpower under Project 646030, AFWERX, were realigned from the Air Force Operations and Maintenance (O&M) appropriation, Budget Activity (BA-04), to now use Research, Development, Test, and Evaluation funds.

	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	-	20.173	0.000	14.768	-	14.768	-	-	N/A

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0604317F / <i>Technology Transfer</i>	Project (Number/Name) 646030 / <i>AFwerX</i>
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FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

<i>AFwerX</i>	
AFwerX	[REDACTED]

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Exhibit R-4A, RDT&E Schedule Details: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0604317F / <i>Technology Transfer</i>	Project (Number/Name) 646030 / <i>AFwerX</i>
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Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>AFwerX</i>				
<i>AFwerX</i>	1	2020	4	2021

Note

In FY 2022, all efforts and civilian manpower under Project 646030, AFWERX, were realigned from the Air Force Operations and Maintenance (O&M) appropriation, Budget Activity (BA-04), to now use Research, Development, Test, and Evaluation funds.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 0604327F I <i>Hard and Deeply Buried Target Defeat System (HDBTDS) Program</i>
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COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
Total Program Element	0.000	111.506	52.825	15.886	0.000	15.886	-	-	-	-	-	-
645341: <i>Direct Strike Penetrator Systems</i>	0.000	111.506	52.825	15.886	0.000	15.886	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-	-	-

A. Mission Description and Budget Item Justification

The Direct Strike Penetrator Systems program develops and modifies a family of advanced precision-guided penetrator munitions to include evaluation of integrated technologies for the development/integration of advanced position, navigation, and timing (PNT) capabilities (i.e., Global Positioning System (GPS), non-GPS, optical, passive, active, etc.) and smart fuze systems, and all penetrator components, that will provide the Air Force with improved ability to attack Hard and Deeply Buried Targets (HDBT), such as bunker and tunnel facilities, using air-to-surface conventional munitions. Systems developed include, but are not limited to Massive Ordnance Penetrator (MOP), GBU-72 Advanced 5,000-lb Penetrator Weapon System (A5K), and Section 804 Rapid Prototype/Rapid Fielding activities. Systems developed will be integrated onto current and future platforms to reduce the number of weapons required to hold HDBTs at risk and will result in more targets engaged per mission flown. Direct Strike Penetrators will provide critical global strike capability not met by inventory conventional weapons and will hold at risk the best protected high value assets essential to an enemy's war fighting ability. The project also provides an opportunity to quickly insert emerging technologies into existing and developing aircraft munitions and fuzes.

A Hard Target Munitions (HTM) Analysis-of-Alternatives (AoA) was conducted in 2014 to determine the best weapons and/or development efforts for addressing the HDBT mission area. The HTM AoA determined that it was necessary to develop a family of HTMs in order to apply effects to the entire range of HDBT sets. The Air Force is using the AoA to develop, produce and modify HDBT weapons identified as the most effective and affordable. Modeling and simulation is used to assess and characterize current inventory and, to drive design and explore the utility of new classes of penetrator munitions.

This requirement supports performance of a full financial audit as required by title 10 U.S.C. Chapter 9A, Sec 240-D.

This program element may include necessary emergent or unanticipated civilian pay expenses required to manage, execute, and deliver Hard and Deeply Buried Targets Defense System for emergent or unanticipated weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program element 0605831F. In FY20 \$0M was expended for civilian pay expenses in this program element, and in FY21 \$1.468M is forecasted for civilian pay expenses in this program element.

The FY2022 funding was request was reduced by \$0.848M to account for the availability of prior year execution balances.

This effort is in Budget Activity 4, Advanced Component Development and Prototypes (ACD&P), because efforts are necessary to evaluate integrated technologies, representative modes or prototype systems in a high fidelity and realistic operating environment.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force	Date: May 2021
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Appropriation/Budget Activity 3600: Research, Development, Test & Evaluation, Air Force I BA 4: Advanced Component Development & Prototypes (ACD&P)	R-1 Program Element (Number/Name) PE 0604327F I Hard and Deeply Buried Target Defeat System (HDBTDS) Program
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B. Program Change Summary (\$ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Previous President's Budget	113.121	52.921	16.974	0.000	16.974
Current President's Budget	111.506	52.825	15.886	0.000	15.886
Total Adjustments	-1.615	-0.096	-1.088	0.000	-1.088
• Congressional General Reductions	0.000	-0.096			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	-1.615	0.000			
• Other Adjustments	0.000	0.000	-1.088	0.000	-1.088

Change Summary Explanation

No Significant Changes

C. Accomplishments/Planned Programs (\$ in Millions)	FY 2020	FY 2021	FY 2022
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Title: Massive Ordnance Penetrator (MOP) Modification	67.903	45.306	15.886
Description: Modify the Massive Ordnance Penetrator (MOP) weapon for enhanced capability to hold additional Hard and Deeply Buried Targets at risk in multiple Combatant Commands (COCOMs). The modification will be primarily software-based and the existing inventory of Guided Bomb Unit (GBU)-57E/B will be retrofitted. Construct relevant hard and deeply buried targets for testing. Execute MOP testing in support of modification efforts to included sub-scale and full-scale ground and flight tests. Analyze MOP weapon effectiveness.			
FY 2021 Plans: Continue testing and evaluating integration of MOP Modification for enhanced capability. Build long-lead targets and accomplish flight tests for expanded aircraft employment.			
FY 2022 Plans: Complete long-lead target build and test & evaluation of MOP Modification for enhanced capability.			
FY 2021 to FY 2022 Increase/Decrease Statement: Funding decreased due to MOP Modification EMD efforts ramping down.			
Title: Advanced 5,000 lb (A5K) Penetrator	43.603	5.369	0.000

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force	Date: May 2021
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Appropriation/Budget Activity 3600: Research, Development, Test & Evaluation, Air Force I BA 4: Advanced Component Development & Prototypes (ACD&P)	R-1 Program Element (Number/Name) PE 0604327F I Hard and Deeply Buried Target Defeat System (HDBTDS) Program
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C. Accomplishments/Planned Programs (\$ in Millions)	FY 2020	FY 2021	FY 2022
<p>Description: GBU-72 Advanced 5,000 lb (A5K) Penetrator is an improved 5,000 lb class penetrator to address capability gaps identified in the HTM AoA. Conduct A5K design, development, integration, modeling and simulation, and testing to improve performance against increasingly hardened targets. This effort utilizes existing and improved technologies to field an integrated penetrator weapon system to include: an improved penetrator warhead, a smart fuze system that can detect layers/voids, and a modified Joint Direct Attack Munition (JDAM) tail kit for all weather, precision guidance, navigation, and control.</p> <p>FY 2021 Plans: Complete JDAM integration and DT/OT flight tests to support fielding recommendation.</p> <p>FY 2022 Plans: N/A</p> <p>FY 2021 to FY 2022 Increase/Decrease Statement: Funding decreased due to realignment of funds to A5K for Smart Fuzing Effort.</p>			
<p>Title: Military Code (M-Code) and Enhanced Anti-Jam (EAJ)</p> <p>Description: M-Code and EAJ provides the capability to operate in increasing adversarial anti-access/area denial (A2/AD) jamming environments. M-Code and EAJ also provide increased accuracy, better signal acquisition, and advanced security.</p> <p>FY 2021 Plans: Developing M-Code integration into MOP weapon system.</p> <p>FY 2022 Plans: N/A</p> <p>FY 2021 to FY 2022 Increase/Decrease Statement: Funding decreased due to M-Code transitioning from development to integration in the MOP weapon system.</p>	0.000	2.150	0.000
Accomplishments/Planned Programs Subtotals	111.506	52.825	15.886

D. Other Program Funding Summary (\$ in Millions)											
Line Item	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
• PAAF 01 353190: Massive Ordnance Penetrator (MOP)	-	-	15.500	-	15.500	-	-	-	-	-	-
• PAAF 01 353020: General Purpose Bombs	621.732	369.566	176.565	-	176.565	-	-	-	-	-	-

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force	Date: May 2021
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Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 0604327F I <i>Hard and Deeply Buried Target Defeat System (HDBTDS) Program</i>
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D. Other Program Funding Summary (\$ in Millions)

<u>Line Item</u>	<u>FY 2020</u>	<u>FY 2021</u>	<u>FY 2022</u> <u>Base</u>	<u>FY 2022</u> <u>OCO</u>	<u>FY 2022</u> <u>Total</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>FY 2026</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• RDTE 05 0604602F: <i>Armament/ Ordnance Development</i>	29.505	23.034	9.047	-	9.047	-	-	-	-	-	-
• RDTE 05 0604618F: <i>Joint Direct Attack Munition</i>	-	6.806	-	-	-	-	-	-	-	-	-
• RDTE 04 0604201F: <i>PNT Resiliency</i>	120.267	-	39.742	-	39.742	-	-	-	-	-	-

Remarks

E. Acquisition Strategy

MOP uses sole source cost type contracts to complete development, test, and evaluation activities.

M-Code/EAJ effort uses a Family of Systems approach where the three prime weapons contractors develop receivers capable of operating in any of their AF weapons. The receivers are based on a common, internally-developed interface requirements specification, technology requirement document, and threat scenario. This approach uses a combination of contract types based on acquisition phase (Technology Maturation and Risk Reduction, Development, Production) and risk. The Weapons System Program Offices share a common development program element to allow flexibility in funding and planning, switching to individual PEs for receiver integration, operational test, and production. The M-Code/EAJ Weapons Receiver Development effort leverages technology currently under development by the GPS-Directorate Military GPS User Equipment program and will provide the warfighter with unmatched capability to operate in future A2/AD environments.

The initial GBU-72/A5K design was accomplished through modeling, simulation, and analysis producing potential designs. The designs were developed based on the performance parameters of survivability, lethality, accuracy and penetration. The Government determined the optimum A5K design to manufacture production representative prototypes to include warheads, fuzes and modified JDAM kits. These assets will be used to conduct and successfully complete qualification testing and integration.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0604327F / <i>Hard and Deeply Buried Target Defeat System (HDBTDS) Program</i>	Project (Number/Name) 645341 / <i>Direct Strike Penetrator Systems</i>
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Product Development (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
MOP Modification and Integration	SS/ Various	Boeing : St Louis, MO	0.000	9.159	Feb 2020	7.893	Feb 2021	6.171	Nov 2021	-		6.171	-	-	-
M-Code/EAJ Receiver	SS/CPAF	Various : TBD	0.000	-		2.150	Jun 2021	-		-		-	-	-	-
A5K Warhead Design/ Components & Cases	MIPR	DOTC/ARA : Albuquerque, NM	0.000	2.480	Oct 2019	-		-		-		-	-	-	-
A5K Guidance (JDAM)	SS/ Various	Boeing : St Louis, MO	0.000	7.863	Dec 2019	-		-		-		-	-	-	-
A5K Embedded Fuze	MIPR	DOTC/ARA/NGIS : Albuquerque, NM	0.000	9.409	Oct 2019	-		-		-		-	-	-	-
Subtotal			0.000	28.911		10.043		6.171		-		6.171	-	-	N/A

Support (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
MOP Govt Support	Various	Various : Eglin AFB, FL	0.000	1.836	Feb 2020	0.125	Feb 2021	2.672	Nov 2021	-		2.672	-	-	-
A5K System T&E Contractor Support	MIPR	DOTC/ARA/NGIS : Albuquerque, NM	0.000	7.885	Oct 2019	-		-		-		-	-	-	-
A5K System T&E Government Support	MIPR	MCAAP : McAlester, OK	0.000	3.078	May 2020	-		-		-		-	-	-	-
Subtotal			0.000	12.799		0.125		2.672		-		2.672	-	-	N/A

Test and Evaluation (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
MOP Test & Evaluation	Various	AFLCMC : Eglin, Holloman, Edw, FL	0.000	23.095	Jan 2020	1.075	Feb 2021	6.203	Nov 2021	-		6.203	-	-	-
MOP Target Construction and Instrumentation	Various	DTRA : Albuquerque, NM	0.000	33.164	Nov 2019	33.527		-		-		-	-	-	-

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0604327F / <i>Hard and Deeply Buried Target Defeat System (HDBTDS) Program</i>	Project (Number/Name) 645341 / <i>Direct Strike Penetrator Systems</i>
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Test and Evaluation (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
A5K Developmental Test & Evaluation	Various	96 TW, 780 TS : Eglin, Holloman, FL	0.000	2.579	Apr 2020	-		-		-		-	-	-	-
A5K Operational Test & Evaluation	Various	96 TW, Det 1, DTRA : Eglin, WSMR, FL	0.000	8.909	Oct 2019	5.354	Jul 2021	-		-		-	-	-	-
Subtotal			0.000	67.747		39.956		6.203		-		6.203	-	-	N/A

Management Services (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
MOP Program Management Administration (PMA)	Various	AFLCMC/EBD : Eglin AFB, FL	0.000	0.649	May 2020	2.686	Oct 2020	0.840	Nov 2021	-		0.840	-	-	-
A5K Program Management Administration (PMA)	Various	AFLCMC/EBD : Eglin AFB, FL	0.000	1.400	Jan 2020	0.015		-		-		-	-	-	-
Subtotal			0.000	2.049		2.701		0.840		-		0.840	-	-	N/A

Remarks
MOP PMA decreased in FY 2022 due to EMD efforts ramping down.

	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	0.000	111.506	52.825	15.886	-	15.886	-	-	N/A

Remarks

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Exhibit R-4A, RDT&E Schedule Details: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0604327F / <i>Hard and Deeply Buried Target Defeat System (HDBTDS) Program</i>	Project (Number/Name) 645341 / <i>Direct Strike Penetrator Systems</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>Direct Strike Penetrator Systems</i>				
MOP Modification Analysis and Testing	1	2020	3	2023
A5K Design, Development and Testing	1	2020	4	2021
M-Code/EAJ Development/Integration	1	2021	4	2021

Note

Fielding M-code integration will be funded through the Weapons SPOs individual PEs.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 0604414F / <i>Cyber Resiliency of Weapon Systems-ACS</i>
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COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
Total Program Element	-	54.676	69.656	71.229	0.000	71.229	-	-	-	-	-	-
642810: <i>Cyber Workforce Development</i>	-	8.200	0.000	0.000	0.000	0.000	-	-	-	-	-	-
642812: <i>Acquisition/System Security Engineering</i>	-	17.001	31.452	26.775	0.000	26.775	-	-	-	-	-	-
642816: <i>Agile/Adaptable Standards</i>	-	7.250	0.000	0.000	0.000	0.000	-	-	-	-	-	-
642834: <i>Mitigations</i>	-	15.387	31.307	36.993	0.000	36.993	-	-	-	-	-	-
642836: <i>Mission Risk Analysis</i>	-	6.838	6.897	7.461	0.000	7.461	-	-	-	-	-	-

A. Mission Description and Budget Item Justification

This program funds activities at the Cyber Resiliency Office for Weapon Systems (CROWS), which provides cyber capabilities and acquisition support to weapon system programs across the Department of the Air Force (DAF). CROWS increases the cyber resiliency of DAF weapon systems to maintain mission effective capability under adverse conditions. Its goals are to bake cyber resiliency into new weapon systems and mitigate critical vulnerabilities in fielded weapon systems. CROWS aligns the DAF with strategic guidance, such as the National Defense Strategy (NDS). The NDS highlights the re-emergence of great power competition as the central challenge to U.S. prosperity and security. This strategic guidance identified the space and cyberspace domains that require the Department of Defense to prioritize investments in cyber defense, resilience, and the continued integration of cyber capabilities into the full spectrum of military operations.

This program addresses cyber resiliency and security gaps in three primary activities to meet these goals. The first activity is to develop systems security engineering tools, techniques and procedures, and associated training and education to build cyber expertise within the acquisition workforce. This includes developing a common secure environment to enable effective sharing of cyber intelligence and vulnerability information across multiple acquisition programs. It also includes identifying emerging technologies for further development and prototyping to posture DAF weapon systems to counter emerging threats. The second activity is to conduct threat informed weapon systems' solution analysis, identify and prioritize vulnerabilities and identify, develop and present courses of action to develop materiel and non-materiel mitigation trade space. The third activity is to design mitigation strategies and prototype mitigation solutions to critical vulnerabilities, with emphasis on those vulnerabilities that affect multiple weapon systems.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver CROWS weapon system capability. The use of such programs funds would be in addition to the civilian pay expenses budgeted in program element 0605831F.

This effort is in Budget Activity 4, Advanced Component Development and Prototypes (ACD&P), because efforts are necessary to evaluate integrated technologies, representative modes or prototype systems in a high fidelity and realistic operating environment.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force	Date: May 2021
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Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 0604414F / <i>Cyber Resiliency of Weapon Systems-ACS</i>
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B. Program Change Summary (\$ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Previous President's Budget	56.325	69.783	79.688	0.000	79.688
Current President's Budget	54.676	69.656	71.229	0.000	71.229
Total Adjustments	-1.649	-0.127	-8.459	0.000	-8.459
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	-1.649	0.000			
• Other Adjustments	0.000	-0.127	-8.459	0.000	-8.459

Change Summary Explanation

Decrease in FY 2020 of \$1.649 is due to SBIR transfer.

Decrease in FY 2021 of \$0.127 is due to higher DAF priorities.

Decrease in FY 2022 of \$8.459 is due to Department of Defense inflationary adjustments of \$1.159M and \$7.3M to Program Element 0605056F Open Architecture Management to appropriately align requirements associated with open architecture/open standards activities.

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0604414F / <i>Cyber Resiliency of Weapon Systems-ACS</i>	Project (Number/Name) 642810 / <i>Cyber Workforce Development</i>
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COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
642810: <i>Cyber Workforce Development</i>	-	8.200	0.000	0.000	0.000	0.000	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-	-	-

A. Mission Description and Budget Item Justification

The Cyber Workforce Development project develops and transitions cyber resiliency training, manning strategies, and deploys teams providing cyber acquisition experts to Program Executive Offices (PEO) to address acquisition workforce gaps in cyber resiliency/security manpower, experience, and knowledge. This project hones workforce expertise and skills required to counter weapon system-unique cyber threats, which exceeds the knowledge needed to secure Internet Protocol (IP) based systems against traditional network-based cyber threats. Such expertise is critical for acquisition professionals to ensure cyber resiliency/security design tenets are integrated into the weapon system's life cycle.

In FY 2021, the entirety of work under Project 642810, Cyber Workforce Development, was transferred to Project 642812, Acquisition/System Security Engineering, to better align scope and resources associated with cyber resiliency of weapon systems activities.

B. Accomplishments/Planned Programs (\$ in Millions)

	FY 2020	FY 2021	FY 2022
Title: Increase Acquisition Workforce Cyber Expertise	8.200	0.000	0.000
Description: Increases knowledge and advanced skills of acquisition workforce.			
FY 2021 Plans: In FY 2021, the work under this effort was transferred to the Prototype, Evaluate, and Transition System Security Engineering effort under Project 642812, Acquisition/System Security Engineering.			
FY 2022 Plans: Not applicable			
Accomplishments/Planned Programs Subtotals	8.200	0.000	0.000

C. Other Program Funding Summary (\$ in Millions)

N/A

Remarks

D. Acquisition Strategy

When possible, activities in this effort will leverage current competitively-awarded contracts. Additional necessary contracts funded in this program element will be awarded using either competitive or sole source procedures, whichever is most appropriate. The government agency responsible for managing the program is the

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0604414F / <i>Cyber Resiliency of Weapon Systems-ACS</i>	Project (Number/Name) 642810 / <i>Cyber Workforce Development</i>
Air Force Life Cycle Management Center, Cyber Resiliency Office for Weapons Systems, Wright-Patterson Air Force Base, Ohio and Hanscom Air Force Base, Massachusetts.		

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0604414F / <i>Cyber Resiliency of Weapon Systems-ACS</i>	Project (Number/Name) 642810 / <i>Cyber Workforce Development</i>
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Product Development (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Education and Training (AFRL, AFIT)	Various	Various : Various	-	0.730	Feb 2020	-		-		-		-	-	-	-
Subtotal			-	0.730		-		-		-		-	-	-	N/A

Remarks
In FY 2021, the entirety of work under Project 642810, Cyber Workforce Development, was transferred to Project 642812, Acquisition/System Security Engineering, to better align scope and resources associated with Cyber Resiliency of Weapon Systems activities.

Support (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
MITRE	Various	MITRE : Bedford, MA	-	6.688	Nov 2019	-		-		-		-	-	-	-
Subtotal			-	6.688		-		-		-		-	-	-	N/A

Remarks
In FY 2021, the entirety of work under Project 642810, Cyber Workforce Development, was transferred to Project 642812, Acquisition/System Security Engineering, to better align scope and resources associated with Cyber Resiliency of Weapon Systems activities.

Management Services (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
A&AS, Travel, Government Purchase Card	Various	Various : Various	-	0.782	Nov 2019	-		-		-		-	-	-	-
Subtotal			-	0.782		-		-		-		-	-	-	N/A

Remarks
In FY 2021, the entirety of work under Project 642810, Cyber Workforce Development, was transferred to Project 642812, Acquisition/System Security Engineering, to better align scope and resources associated with Cyber Resiliency of Weapon Systems activities.

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Exhibit R-4, RDT&E Schedule Profile: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0604414F / <i>Cyber Resiliency of Weapon Systems-ACS</i>	Project (Number/Name) 642810 / <i>Cyber Workforce Development</i>

	FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

<i>Cyber Workforce Development</i>																												
Deploy Cyber Focus Teams																												
Develop basic weapon system cyber awareness training																												
Develop weapon system cyber training																												
Hire/retain cyber security professionals																												

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Exhibit R-4A, RDT&E Schedule Details: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0604414F / <i>Cyber Resiliency of Weapon Systems-ACS</i>	Project (Number/Name) 642810 / <i>Cyber Workforce Development</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>Cyber Workforce Development</i>				
Deploy Cyber Focus Teams	1	2020	4	2020
Develop basic weapon system cyber awareness training	1	2020	4	2020
Develop weapon system cyber training	1	2020	4	2020
Hire/retain cyber security professionals	1	2020	4	2020

Note

In FY 2021, the entirety of work under Project 642810, Cyber Workforce Development, was transferred to Project 642812, Acquisition/System Security Engineering, to better align scope and resources associated with Cyber Resiliency of Weapon Systems activities.

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force										Date: May 2021		
Appropriation/Budget Activity 3600 / 4					R-1 Program Element (Number/Name) PE 0604414F / <i>Cyber Resiliency of Weapon Systems-ACS</i>				Project (Number/Name) 642812 / <i>Acquisition/System Security Engineering</i>			
COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
642812: <i>Acquisition/System Security Engineering</i>	-	17.001	31.452	26.775	0.000	26.775	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Acquisition/System Security Engineering (SSE) activity develops Department of the Air Force (DAF) and Department of Defense system security engineering and acquisition security processes, policies, and contracting language, and refines intelligence collection and processes to provide actionable information on cyber threats to the weapons system community. This activity bolsters Air Force cyber resiliency/security by developing common secure environments for Program Offices to share information on classified weapon system cyber intelligence, threats, and vulnerabilities. It also encompasses developing cyber resiliency training, manning strategies, and Cyber Focus Teams, which provide cyber acquisition expertise to Program Executive Offices (PEO) to address acquisition workforce gaps in cyber resiliency/security manpower, experience, and knowledge. This project hones workforce expertise and skills required to counter weapon system-unique cyber threats, which exceeds the knowledge needed to secure Internet Protocol (IP) based systems against traditional network-based cyber threats. Such expertise is critical for acquisition professionals to ensure cyber resiliency/security design tenets are integrated into the weapon system's life cycle. The project also enables rapid response to emerging peer threats by focusing on early technology readiness level (TRL) efforts via non-traditional industry partners to develop and field cyber resiliency technologies to operational users. Finally, this project includes identification, evaluation, and prioritization of emerging cyber techniques, products, and technologies for further development and prototyping to posture DAF weapon systems to counter emerging threats. This activity supports Air Force Program Offices, the Protecting Critical Technologies Task Force, Defense Industrial Base data protection efforts, Air Force Supply Chain Risk Management, and other weapon system cyber security/resiliency activities as required.

Prior to FY 2021, reporting of Cyber Workforce Development activities were reported under Project 642810, Cyber Workforce Development, and the reporting of Agile/Adaptable Standards activities were reported under Project 642816, Agile/Adaptable Standards.

B. Accomplishments/Planned Programs (\$ in Millions)

	FY 2020	FY 2021	FY 2022
Title: Prototype, Evaluate, and Transition System Security Engineering	17.001	31.452	26.775
Description: Prototypes, evaluates, and transitions cyber security and resiliency activities into policy, processes, products, and people.			
FY 2021 Plans: Continue to evolve the Acquisition/SSE requirements, processes, policies, and contracting language to influence cyber resiliency in all phases of the acquisition process. Refine intelligence collection and processes to provide actionable information on cyber threats to the weapons system community. Continue developing common security environments to enable program offices to collaborate/share information on classified weapon system cyber intelligence threats and vulnerabilities. Continue to deliver cyber			

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0604414F / <i>Cyber Resiliency of Weapon Systems-ACS</i>	Project (Number/Name) 642812 / <i>Acquisition/System Security Engineering</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2020	FY 2021	FY 2022
<p>expertise to PEOs through the Cyber Focus Team (CFT) manpower, identify acquisition cyber resiliency training gaps and develop training to support the acquisition workforce. Continue identification, evaluation, and prioritization of emerging cyber techniques, products, and technologies for further development and prototyping to posture Air Force weapon systems to counter emerging threats.</p> <p><i>FY 2022 Plans:</i> Continue to evolve the Acquisition/SSE requirements, processes, policies, and contracting language to influence cyber resiliency in all phases of the acquisition process. Refine intelligence collection and processes to provide actionable information on cyber threats to the weapons system community. Continue developing common security environments to enable program offices to collaborate/share information on classified weapon system cyber intelligence threats and vulnerabilities as well as the necessary verification and validation infrastructure (technology, hardware/software modelling and lab resources) to understand, reconcile, and program against emerging cyber resiliency attack vectors. Increase delivery of cyber expertise to PEOs through Cyber Focus Team (CFT) manpower, continue to identify acquisition cyber resiliency training gaps and analyze required knowledge and skill sets and develop increasingly more technical and hands on training to support the acquisition workforce. Continue identification, evaluation, and prioritization of emerging cyber techniques, products, and technologies for further development and prototyping to posture Air Force weapon systems to counter emerging threats.</p> <p><i>FY 2021 to FY 2022 Increase/Decrease Statement:</i> FY 2022 decreased compared to FY 2021 by \$4.677 million. Decrease is due to Department of Defense inflationary adjustments and transfer of the open architecture/open standards requirements to Program Element 65056F Open Architecture Management.</p>			
Accomplishments/Planned Programs Subtotals	17.001	31.452	26.775

C. Other Program Funding Summary (\$ in Millions)

N/A

Remarks

D. Acquisition Strategy

When possible, activities in this effort will leverage current competitively-awarded contracts. Additional necessary contracts funded in this program element will be awarded using either competitive or sole source procedures, whichever is most appropriate. The government agency responsible for managing the program is the Air Force Life Cycle Management Center, Cyber Resiliency Office for Weapons Systems, Wright-Patterson Air Force Base, Ohio and Hanscom Air Force Base, Massachusetts.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0604414F / <i>Cyber Resiliency of Weapon Systems-ACS</i>	Project (Number/Name) 642812 / <i>Acquisition/System Security Engineering</i>
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Product Development (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Common Cyber Security Environment	Various	Various : Various	-	9.550	Nov 2019	6.000	Nov 2020	6.250	Nov 2021	-		6.250	-	-	-
Intel collection skills to identify cyber threats to weapon systems	Various	Various : Various	-	6.995	Dec 2019	5.500	Dec 2020	5.750	Dec 2021	-		5.750	-	-	-
Education and Training (AFRL, AFIT)	Various	Various : Various	-	-		1.050	Jan 2021	1.050	Jan 2022	-		1.050	-	-	-
Cyber Resiliency Technologies Development	Various	Various : Various	-	-		11.352	Nov 2020	5.719	Nov 2021	-		5.719	-	-	-
Subtotal			-	16.545		23.902		18.769		-		18.769	-	-	N/A

Remarks
Prior to FY 2021, reporting of Cyber Workforce Development activities were reported under Project 642810, Cyber Workforce Development, and the reporting of Agile/Adaptable Standards activities were reported under Project 642816, Agile/Adaptable Standards.

Support (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
System Security Engineering requirements, policy and guidance documents (DTIC)	Various	Various : Various	-	0.456	Jan 2020	0.456	Jan 2021	0.456	Jan 2022	-		0.456	-	-	-
MITRE	Various	Various : Bedford, MA	-	-		4.410	Nov 2020	4.800	Nov 2021	-		4.800	-	-	-
CMU/SEI	Various	Carnegie Mellon Univ. : Pittsburgh, PA	-	-		1.000	Dec 2020	1.000	Dec 2021	-		1.000	-	-	-
Subtotal			-	0.456		5.866		6.256		-		6.256	-	-	N/A

Remarks
Prior to FY 2021, reporting of Cyber Workforce Development activities were reported under Project 642810, Cyber Workforce Development, and the reporting of Agile/Adaptable Standards activities were reported under Project 642816, Agile/Adaptable Standards.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0604414F / <i>Cyber Resiliency of Weapon Systems-ACS</i>	Project (Number/Name) 642812 / <i>Acquisition/System Security Engineering</i>
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Management Services (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
A&AS, Travel, Government Purchase Card	Various	Various : Various	-	-		1.684	Dec 2020	1.750	Dec 2021	-		1.750	-	-	-
Subtotal			-	-		1.684		1.750		-		1.750	-	-	N/A

Remarks
Prior to FY 2021, reporting of Cyber Workforce Development activities were reported under Project 642810, Cyber Workforce Development, and the reporting of Agile/Adaptable Standards activities were reported under Project 642816, Agile/Adaptable Standards.

	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	-	17.001	31.452	26.775	-	26.775	-	-	N/A

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0604414F / <i>Cyber Resiliency of Weapon Systems-ACS</i>	Project (Number/Name) 642812 / <i>Acquisition/System Security Engineering</i>

FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

Acquisition/System Security Engineering	
Prototype and deliver common cyber security environments	
Prototype and deliver enhanced system security engineering processes and products	
Prototype and deliver cyber security design and contractual requirements	
Prototype and deliver acquisition cyber intel analysis products and techniques	
Develop weapon system cyber training	
Deploy cyber focus teams	
Prototype advanced cyber resiliency technology	
Prototype and update open standards	

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Exhibit R-4A, RDT&E Schedule Details: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0604414F / <i>Cyber Resiliency of Weapon Systems-ACS</i>	Project (Number/Name) 642812 / <i>Acquisition/System Security Engineering</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
Acquisition/System Security Engineering				
Prototype and deliver common cyber security environments	1	2020	4	2026
Prototype and deliver enhanced system security engineering processes and products	1	2020	4	2026
Prototype and deliver cyber security design and contractual requirements	1	2020	4	2026
Prototype and deliver acquisition cyber intel analysis products and techniques	1	2020	4	2026
Develop weapon system cyber training	1	2021	4	2026
Deploy cyber focus teams	1	2021	4	2026
Prototype advanced cyber resiliency technology	1	2021	4	2026
Prototype and update open standards	1	2021	4	2021

Note

Previous to FY 2021, Cyber Workforce Development activities are reported under Project 642810, Cyber Workforce Development, and Agile/Adaptable Standards activities are reported under Project 642816, Agile/Adaptable Standards.

Beginning in FY 2022, the open architecture/open standards mission will transfer to program element 0605056F to better align scope and resources associated with these activities.

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0604414F / <i>Cyber Resiliency of Weapon Systems-ACS</i>	Project (Number/Name) 642816 / <i>Agile/Adaptable Standards</i>
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COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
642816: <i>Agile/Adaptable Standards</i>	-	7.250	0.000	0.000	0.000	0.000	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-	-	-

A. Mission Description and Budget Item Justification

The Agile/Adaptable Standards project identifies, evaluates and prioritizes emerging cyber techniques, products, and technologies for further development and prototyping to posture Department of the Air Force (DAF) weapon systems to counter emerging threats.

In FY 2021, the entirety of work under Project 642816, Agile/Adaptable Standards, was transferred to Project 642812, Acquisition/System Security Engineering, to better align scope and resources associated with Cyber Resiliency of Weapon Systems activities.

B. Accomplishments/Planned Programs (\$ in Millions)

	FY 2020	FY 2021	FY 2022
Title: Agile and Adaptable Standards	7.250	0.000	0.000
Description: Develop, prototype, evaluate, and transition agile and adaptable system standards for integration into DAF weapon systems.			
FY 2021 Plans: In FY 2021, the work under this effort was transferred to the Prototype, Evaluate, and Transition System Security Engineering effort under Project 642812, Acquisition/System Security Engineering.			
FY 2022 Plans: Not applicable			
Accomplishments/Planned Programs Subtotals	7.250	0.000	0.000

C. Other Program Funding Summary (\$ in Millions)

N/A

Remarks

D. Acquisition Strategy

When possible, activities in this effort will leverage current competitively-awarded contracts. Additional necessary contracts funded in this program element will be awarded using either competitive or sole source procedures, whichever is most appropriate. The government agency responsible for managing the program is the Air Force Life Cycle Management Center, Cyber Resiliency Office for Weapons Systems, Wright-Patterson Air Force Base, Ohio and Hanscom Air Force Base, Massachusetts.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0604414F / <i>Cyber Resiliency of Weapon Systems-ACS</i>	Project (Number/Name) 642816 / <i>Agile/Adaptable Standards</i>
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Product Development (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Cyber Resiliency Technology - Open system architecture	Various	Various : Various	-	6.000	Feb 2020	-		-		-		-	-	-	-
Cyber Resiliency Technology - (Firesky, Pitchday, Cloud One)	Various	Various : Various	-	1.250	Jan 2020	-		-		-		-	-	-	-
Subtotal			-	7.250		-		-		-		-	-	-	N/A

Remarks
 In FY 2021, the entirety of work under Project 642816, Agile/Adaptable Standards, was transferred to Project 642812, Acquisition/System Security Engineering, to better align scope and resources associated with Cyber Resiliency of Weapon Systems activities.

	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	-	7.250	0.000	-	-	-	-	-	N/A

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0604414F / <i>Cyber Resiliency of Weapon Systems-ACS</i>	Project (Number/Name) 642816 / <i>Agile/Adaptable Standards</i>

FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

Agile/Adaptable Standards	
Transition resilient embedded GPS/INS (REGI) technology and design to PNT Program Office	██████████
Prototype and update open standards	██████████

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Exhibit R-4A, RDT&E Schedule Details: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0604414F / <i>Cyber Resiliency of Weapon Systems-ACS</i>	Project (Number/Name) 642816 / <i>Agile/Adaptable Standards</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>Agile/Adaptable Standards</i>				
Transition resilient embedded GPS/INS (REGI) technology and design to PNT Program Office	1	2020	3	2020
Prototype and update open standards	1	2020	4	2020

Note

In FY 2021, the entirety of work under Project 642816, Agile/Adaptable Standards, was transferred to Project 642812, Acquisition/System Security Engineering, to better align scope and resources associated with Cyber Resiliency of Weapon Systems activities.

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force										Date: May 2021		
Appropriation/Budget Activity 3600 / 4					R-1 Program Element (Number/Name) PE 0604414F / <i>Cyber Resiliency of Weapon Systems-ACS</i>				Project (Number/Name) 642834 / <i>Mitigations</i>			
COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
642834: <i>Mitigations</i>	-	15.387	31.307	36.993	0.000	36.993	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Mitigations activity prototypes mitigations to high risk cyber vulnerabilities and recommends a transition path for fielded weapon systems, subsystems, and support systems. CROWS program will perform the engineering analysis and partner with program offices for the affected weapon systems to develop a mitigation strategy. CROWS will lead the non-recurring engineering effort to prototype a mitigation that can be fielded on multiple weapon systems and transition the mitigation to programs for implementation and sustainment. CROWS will develop a mitigation handbook that catalogs proven materiel mitigations for use across Department of the Air Force weapon systems program offices to maximize return on investment in the prototyping activity.

B. Accomplishments/Planned Programs (\$ in Millions)

	FY 2020	FY 2021	FY 2022
Title: Cyber Mitigation Prototyping	15.387	31.307	36.993
Description: Evaluate weapon systems cyber risk assessments to identify, validate, and prioritize mitigations required for cyber vulnerabilities/susceptibilities. Partner with system owners and acquisition Program Offices to develop prototype mitigations.			
FY 2021 Plans: Continue prototyping mitigations for cyber vulnerabilities on fielded weapon systems, subsystems, and support systems in realistic, high fidelity environments. Collaborate with system owners and acquisition program offices to prototype mitigation projects and implement technology transfer of prototyped solutions within the associated acquisition program office. Develop centralized data repository for mitigations addressing weapon system cyber vulnerabilities.			
FY 2022 Plans: Continue focus on prototyping mitigations for cyber vulnerabilities on fielded weapon systems, subsystems, and support systems in realistic, high fidelity environments and identifying threat-informed risks/vulnerabilities. Collaborate with system owners and acquisition program offices to prototype mitigation projects and implement technology transfer of prototyped solutions within the associated acquisition program office. Develop centralized data repository for mitigations addressing weapon system cyber risks and vulnerabilities. Support mitigation integration requirements by translating/mapping threats to enterprise mitigation techniques using mature methodologies for weapon system common reference architectures. Build and implement a strategy to manage OSD's & NSA's requests on DAF weapon systems' cyber vulnerability and mitigation activities.			
FY 2021 to FY 2022 Increase/Decrease Statement: FY 2022 increased compared to FY 2021 by 5.686 million. Increase due to additional developments for F-35, Space Force, and Nuclear Weapon Center cyber mitigations and platform integration in response to the previously completed NDAA s. 1647 Critical Weapon System vulnerability assessments (virtual, physical, and cyber infrastructure). This project supports Joint Requirements			

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force	Date: May 2021
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Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0604414F / <i>Cyber Resiliency of Weapon Systems-ACS</i>	Project (Number/Name) 642834 / <i>Mitigations</i>
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B. Accomplishments/Planned Programs (\$ in Millions)	FY 2020	FY 2021	FY 2022
Oversight Council Memorandums (JROCM) 039-16 and 094-20 for NDAA 1647 and NDAA 1640 weapon system assessments and mitigations.			
Accomplishments/Planned Programs Subtotals	15.387	31.307	36.993

C. Other Program Funding Summary (\$ in Millions)

N/A

Remarks

D. Acquisition Strategy

When possible, activities in this effort will leverage current competitively-awarded contracts. Additional necessary contracts funded in this program element will be awarded using either competitive or sole source procedures. The government agency responsible for managing the program is the Air Force Life Cycle Management Center, Cyber Resiliency Office for Weapons Systems, Wright-Patterson Air Force Base, Ohio and Hanscom Air Force Base, Massachusetts.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Air Force												Date: May 2021				
Appropriation/Budget Activity				R-1 Program Element (Number/Name)				Project (Number/Name)								
3600 / 4				PE 0604414F / Cyber Resiliency of Weapon Systems-ACS				642834 / Mitigations								
Product Development (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total				
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract	
Material Solutions for Major Weapon Systems	Various	Various : Various	-	5.797	Dec 2019	9.558	Dec 2020	13.053	Jan 2022	-		13.053	-	-	-	
Material Solutions for Subsystems	Various	Various : Various	-	2.249	Dec 2019	6.279	Dec 2020	7.963	Dec 2021	-		7.963	-	-	-	
Non-Materiel Solutions	Various	Various : Various	-	1.239	Dec 2019	3.768	Dec 2020	3.957	Dec 2021	-		3.957	-	-	-	
Mitigation Distribution Tool	Various	Various : Various	-	0.659	Dec 2019	2.512	Dec 2020	2.730	Dec 2021	-		2.730	-	-	-	
Subtotal			-	9.944		22.117		27.703		-		27.703	-	-	N/A	
Support (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total				
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract	
MITRE	Various	Various : Bedford, MA	-	-		3.000	Jan 2021	3.000	Jan 2022	-		3.000	-	-	-	
Defense Technical Information Center (DTIC)	Various	Various : Various	-	0.240	Jan 2020	0.240	Jan 2021	0.240	Jan 2022	-		0.240	-	-	-	
Gartner	Various	Various : Various	-	0.485	Dec 2019	0.600	Nov 2020	0.600	Nov 2021	-		0.600	-	-	-	
Subtotal			-	0.725		3.840		3.840		-		3.840	-	-	N/A	
Management Services (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total				
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract	
A&AS, Travel, Government Purchase Card	Various	Various : Various	-	4.718	Oct 2019	5.350	Dec 2020	5.450	Dec 2021	-		5.450	-	-	-	
Subtotal			-	4.718		5.350		5.450		-		5.450	-	-	N/A	
Project Cost Totals			-	15.387		31.307		36.993		-		36.993	-	-	N/A	

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Air Force							Date: May 2021			
Appropriation/Budget Activity 3600 / 4			R-1 Program Element (Number/Name) PE 0604414F / <i>Cyber Resiliency of Weapon Systems-ACS</i>			Project (Number/Name) 642834 / <i>Mitigations</i>				
	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract	

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0604414F / <i>Cyber Resiliency of Weapon Systems-ACS</i>	Project (Number/Name) 642834 / <i>Mitigations</i>

FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

Mitigations																												
Prototype cyber mitigations on known cyber vulnerabilities																												
Identify transition plan for tested mitigations to known cyber vulnerabilities																												
Mitigation Data Repository																												

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Exhibit R-4A, RDT&E Schedule Details: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0604414F / <i>Cyber Resiliency of Weapon Systems-ACS</i>	Project (Number/Name) 642834 / <i>Mitigations</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
Mitigations				
Prototype cyber mitigations on known cyber vulnerabilities	1	2020	4	2026
Identify transition plan for tested mitigations to known cyber vulnerabilities	1	2020	4	2026
Mitigation Data Repository	1	2020	4	2026

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0604414F / <i>Cyber Resiliency of Weapon Systems-ACS</i>	Project (Number/Name) 642836 / <i>Mission Risk Analysis</i>
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COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
642836: <i>Mission Risk Analysis</i>	-	6.838	6.897	7.461	0.000	7.461	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-	-	-

A. Mission Description and Budget Item Justification

Discover and analyze cyber susceptibilities/vulnerabilities to Department of the Air Force (DAF) weapon systems and characterize their impacts based on mission risk. Promote the enhancement of cyber discovery methodologies and capabilities within DAF. Focus is on assessing the gaps and seams that exist between defined weapon system boundaries and within areas that are not assigned to specific weapon system program offices. This activity builds upon existing efforts that identify and mitigate cyber vulnerabilities, and does not duplicate similar ongoing efforts or conduct redundant assessments on systems that have already been evaluated. As the Acquisition/System Security Engineering activity under Project 642812 develops Cyber Focus Teams, additional, more robust assessment data sets will be generated for CROWS to continue identifying and validating vulnerabilities. This activity disseminates cyber risk information to inform acquisition decisions, provides feedback to focus future assessments and also feeds into the Mitigations activity under Project 642834.

B. Accomplishments/Planned Programs (\$ in Millions)

	FY 2020	FY 2021	FY 2022
Title: Cyber Mission Risk Analysis	6.838	6.897	7.461
Description: Discovers, analyzes and coordinates sharing of information in support of cyber risk discovery activities for DAF weapon systems.			
FY 2021 Plans: Continue to coordinate cyber vulnerability assessments and develop a capability to provide focused assessments where required. Continue developing solutions to find, assess and share cyber vulnerabilities through an enterprise-level data analysis capability.			
FY 2022 Plans: Continue to coordinate cyber vulnerability assessments and develop a capability to provide focused assessments where required. Continue developing solutions to find, assess, and share cyber vulnerabilities through an enterprise-level data analysis capability. Establish service level cyber resiliency Red/Blue Team to augment DoD cyber vulnerability assessment by providing subject matter expertise for ongoing discovery tasks.			
FY 2021 to FY 2022 Increase/Decrease Statement: FY 2022 increased compared to FY 2021 by 0.564 million. Increase to account for Department of Defense inflationary adjustments and additional emphasis on continued Cyber Mission risk analysis and discovery on weapon systems and across mission areas. Also includes increased breadth of application in assessment teams to continue 2016 NDAA s. 1647 assessment regularity as well as support service level involvement in the 2018 NDAA s. 1640 Strategic Cybersecurity Program.			
Accomplishments/Planned Programs Subtotals	6.838	6.897	7.461

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0604414F / <i>Cyber Resiliency of Weapon Systems-ACS</i>	Project (Number/Name) 642836 / <i>Mission Risk Analysis</i>

C. Other Program Funding Summary (\$ in Millions)

N/A

Remarks

D. Acquisition Strategy

When possible, activities in this effort will leverage current competitively-awarded contracts. Additional necessary contracts funded in this program element will be awarded using either competitive or sole source procedures, whichever is most appropriate. The government agency responsible for managing the program is the Air Force Life Cycle Management Center, Cyber Resiliency Office for Weapons Systems, Wright-Patterson Air Force Base, Ohio and Hanscom Air Force Base, Massachusetts.

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Exhibit R-4, RDT&E Schedule Profile: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0604414F / <i>Cyber Resiliency of Weapon Systems-ACS</i>	Project (Number/Name) 642836 / <i>Mission Risk Analysis</i>

	FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

Mission Risk Analysis	
Develop, institutionalize and utilize a Data Aggregation & Analytics Tool (DAAT).	
Execute risk analysis and discovery on weapons systems and across mission areas. Leverage and augment existing and emerging assessment environments and tools.	
Engineer solution candidates for reducing cyber risk with DAF weapon systems.	

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Exhibit R-4A, RDT&E Schedule Details: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0604414F / <i>Cyber Resiliency of Weapon Systems-ACS</i>	Project (Number/Name) 642836 / <i>Mission Risk Analysis</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>Mission Risk Analysis</i>				
Develop, institutionalize and utilize a Data Aggregation & Analytics Tool (DAAT).	1	2020	4	2026
Execute risk analysis and discovery on weapons systems and across mission areas. Leverage and augment existing and emerging assessment environments and tools.	1	2020	4	2026
Engineer solution candidates for reducing cyber risk with DAF weapon systems.	1	2020	4	2026

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 0604776F / <i>Deployment & Distribution Enterprise R&D</i>
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COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
Total Program Element	-	27.618	25.788	40.103	0.000	40.103	-	-	-	-	-	-
640211: <i>GLOBAL ACCESS</i>	-	7.493	5.633	9.484	0.000	9.484	-	-	-	-	-	-
640212: <i>C2/OPTIMIZATION/ MODELING AND SIMULATION</i>	-	14.767	14.726	24.958	0.000	24.958	-	-	-	-	-	-
640213: <i>CYBER</i>	-	5.358	5.429	5.461	0.000	5.461	-	-	-	-	-	-
640215: <i>Transportation Management Service</i>	-	0.000	0.000	0.200	0.000	0.200	-	-	-	-	-	-

Note

- This program, BA 4, PE 0604776F, project 640212, Joint Transportation Management System, is a new start.
- This program, BA 4, PE 0604776F, project 640212, Ares Dynamic Network Automation, is a new start.
- This program, BA 4, PE 0604776F, project 640212, Resilient Logistics JCTD, is a new start.
- This program, BA 4, PE 0604776F, project 640212, Safety Analysis of Modified Midwest Guardrail, is a new start.
- This program, BA 4, PE 0604776F, project 640212, Aerial Delivery and Autonomous Deployment of Unmanned Vehicles, is a new start.
- This program, BA 4, PE 0604776F, project , Transportation Financial Product Development, is a new start.

A. Mission Description and Budget Item Justification

This program provides for the development, integration, demonstration and detailed assessment of capabilities which improve deployment, distribution and supply chain decision-making/collaboration (e.g., planning stage to real-time execution/retrograde operations) without need for highly specialized operators. Projects in this area address the following: decision support tools, distribution process simulations/analytics, distribution demand forecasting/execution monitoring, automated decision-maker support (e.g., queuing, alerting, courses of action), automated status monitoring with information fusion to include drilldown capability, and resilient Command & Control (C2) infrastructure capabilities. Current planning, forecasting, and collaboration capabilities do not permit full synchronization of people, processes and assets to execute planned operations. Automated tools must be able to dynamically analyze/predict demand and provide input to advanced distribution planning systems to include the capability for Combatant Commanders to manage theater transportation operations from the port of debarkation to the point of need. Transportation information exchange across the DOD is inhibited by disparate systems, multiple data standards and insufficient interfaces. The ability to rapidly determine the impact of any delays/changes and conduct "what-if" impact assessments on the closure of force packages is required. This project addresses the required mission support to combatant commanders and other customers in the area of C2, Optimization, and Modeling and Simulations.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver weapon system capability. The use of such programs funds would be in addition to the civilian pay expenses budgeted in program element 0605831F. In FY20 \$0M was expended for civilian pay expenses in this program element, and in FY21 \$0M is forecasted for civilian pay expenses in this program element.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force	Date: May 2021
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Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 0604776F / <i>Deployment & Distribution Enterprise R&D</i>
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This effort is in Budget Activity 4, Advanced Component Development and Prototypes (ACD&P), because efforts are necessary to evaluate integrated technologies, representative modes or prototype systems in a high fidelity and realistic operating environment.

B. Program Change Summary (\$ in Millions)	<u>FY 2020</u>	<u>FY 2021</u>	<u>FY 2022 Base</u>	<u>FY 2022 OCO</u>	<u>FY 2022 Total</u>
Previous President's Budget	28.034	25.835	30.006	0.000	30.006
Current President's Budget	27.618	25.788	40.103	0.000	40.103
Total Adjustments	-0.416	-0.047	10.097	0.000	10.097
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	-0.047			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	-0.416	0.000			
• Other Adjustments	0.000	0.000	10.097	0.000	10.097

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0604776F / <i>Deployment & Distribution Enterprise R&D</i>	Project (Number/Name) 640211 / <i>GLOBAL ACCESS</i>
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COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
640211: <i>GLOBAL ACCESS</i>	-	7.493	5.633	9.484	0.000	9.484	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-	-	-

A. Mission Description and Budget Item Justification

This program provides for the development, integration, demonstration and detailed assessment of DOD procedures/technologies targeted at optimizing throughput at the nodes as well as across the conduits of the deployment and distribution supply chains, from origin to point of use as well as return. Needed capabilities include inventory/cargo management, materiel handling innovations, improved physical node access, port throughput improvements, innovative delivery methods (e.g., precision airlift, autonomous re-supply), and cargo/container security. This project addresses required mission support to combatant commanders and other customers of DOD's distribution and transportation systems in the area of deployment/distribution velocity management, manned/unmanned systems to the point of effect, and increased global reach in austere/anti-access environments.

B. Accomplishments/Planned Programs (\$ in Millions)

	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
<p>Title: COVID Commercial Aircraft Air Flow Test</p> <p>Description: Test how COVID virus spreads in commercial aircraft cabins</p> <p>FY 2021 Plans: Project ended in FY20</p> <p>FY 2022 Base Plans: No funding requested</p>	0.520	0.000	0.000	-	0.000
<p>Title: Contingency Response Wing Mobile Power Generation</p> <p>Description: Develop a light weight mobile generator</p> <p>FY 2021 Plans: Project ended FY20</p> <p>FY 2022 Base Plans: No funding requested</p>	0.500	0.000	0.000	-	0.000
<p>Title: Petroleum Undersea Sustainment Hose</p> <p>Description: Provide an agile, submersible over-the-shore conduit that can be pre-positioned or immediately employed from vessels of opportunity such as a commercial offshore supply vessel (OSV).</p>	-	0.400	0.450	-	0.450

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force			Date: May 2021		
Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0604776F / <i>Deployment & Distribution Enterprise R&D</i>	Project (Number/Name) 640211 / <i>GLOBAL ACCESS</i>			
B. Accomplishments/Planned Programs (\$ in Millions)					
	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
FY 2021 Plans: Develop a submersible over-the-shore conduit					
FY 2022 Base Plans: Addresses Sea Basing Technologies/Logistics-Over-The-Shore need to enhance the Joint Force Commander's flexibility					
FY 2021 to FY 2022 Increase/Decrease Statement: No significant change					
Title: Collision Avoidance and Navigation Insight System					
Description: Autonomous Technologies applied to the 60K Tunner to improve throughput and safety					
FY 2021 Plans: Test semi autonomous technologies					
FY 2022 Base Plans: Test semi autonomous technologies					
FY 2021 to FY 2022 Increase/Decrease Statement: Development varies by FY					
Title: Joint Deployable Airborne Package					
Description: Airworthiness certification for a rapidly deployable, modular and scalable airborne C4 communications platform to replace the current antiquated and end-of-life Joint Airborne Communications Center/Command Post					
FY 2021 Plans: Project ends in FY20					
FY 2022 Base Plans: No funding requested					
FY 2021 to FY 2022 Increase/Decrease Statement: Project ended in FY20.					
Title: Submersible Matting					
	0.250	0.500	1.150	-	1.150
	0.078	0.000	0.000	-	0.000
	0.000	0.500	1.000	-	1.000

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0604776F / <i>Deployment & Distribution Enterprise R&D</i>	Project (Number/Name) 640211 / <i>GLOBAL ACCESS</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
<p>Description: Develop a submersible matting system (SUBMAT) to facilitate mobility across the shoreline and wet/dry gaps by combining current soil stability technology and mobility matting into a single product.</p> <p>FY 2021 Plans: Design for manufacture analysis and preliminary fabrication</p> <p>FY 2022 Base Plans: Design for manufacture analysis and preliminary fabrication</p> <p>FY 2021 to FY 2022 Increase/Decrease Statement: Project varies by year.</p>					
<p>Title: Rapid Available Interface for trans-Loading</p> <p>Description: Provides a process to rapidly assess the condition, design acceptable repairs and delivers pre-kitted rail repair and retrofit solutions. The standardized repair kits allows for the development of Tactics, Techniques and Procedures (TTPs) for each repair that can be scaled to address a range of damages.</p> <p>FY 2021 Plans: Identify and develop a robotic survey vehicle integrated with rail condition survey equipment.</p> <p>FY 2022 Base Plans: Work will identify and develop a robotic survey vehicle integrated with rail condition survey equipment.</p> <p>FY 2021 to FY 2022 Increase/Decrease Statement: Development varies by FY</p>	0.050	0.450	0.694	-	0.694
<p>Title: Repair and Retrofit of Railway Systems</p> <p>Description: The standardized repair kits allows for the development of Tactics, Techniques and Procedures (TTPs) for each repair that can be scaled to address a range of damages.</p> <p>FY 2021 Plans: Identify and develop a robotic survey vehicle integrated with rail condition survey equipment.</p> <p>FY 2022 Base Plans: Work will identify and develop a robotic survey vehicle integrated with rail condition survey equipment.</p> <p>FY 2021 to FY 2022 Increase/Decrease Statement:</p>	0.000	0.500	0.250	-	0.250

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0604776F / <i>Deployment & Distribution Enterprise R&D</i>	Project (Number/Name) 640211 / <i>GLOBAL ACCESS</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Development varies by FY					
<p>Title: Drone Supported Surface Deployment</p> <p>Description: Determine the suitability of using modern drones and drone mapping technology for capturing data for input to systems such as the Integrated Computerized Deployment System (ICODES) and the Transportation Geospatial Information System (TGIS)</p> <p>FY 2021 Plans: Analyze RFID Hardware, Middleware and Software</p> <p>FY 2022 Base Plans: Will analyze RFID Hardware, Middleware and Software</p> <p>FY 2021 to FY 2022 Increase/Decrease Statement: Development varies by FY</p>	0.000	0.348	0.250	-	0.250
<p>Title: Buoyant Roll On/Roll Off Interface Kit</p> <p>Description: Prototype consisting of the RO/RO ramp to interface to a commercial supply vessel and a section of floating causeway and ancillary equipment sufficient to conduct a limited operational assessment</p> <p>FY 2021 Plans: Develop a prototype rapidly deployable ship-to-shore connector capability</p> <p>FY 2022 Base Plans: Develop a prototype rapidly deployable ship-to-shore connector capability</p> <p>FY 2021 to FY 2022 Increase/Decrease Statement: Development varies by FY</p>	0.000	0.100	0.800	-	0.800
<p>Title: 35 Thousand Foot Airdrop</p> <p>Description: Develop capabilities to airdrop from 35 thousand feet to increase aircraft standoff range from threat.</p> <p>FY 2021 Plans: parafoil and parachute technologies</p> <p>FY 2022 Base Plans:</p>	0.000	0.650	1.000	-	1.000

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force			Date: May 2021		
Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0604776F / <i>Deployment & Distribution Enterprise R&D</i>	Project (Number/Name) 640211 / <i>GLOBAL ACCESS</i>			
B. Accomplishments/Planned Programs (\$ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
parafoil and parachute technologies FY 2021 to FY 2022 Increase/Decrease Statement: Development varies by FY					
Title: Interoperable Multi-modal Patient Movement Description: Create system to move mass casualties when air medivac is not available FY 2021 Plans: Continue development and testing FY 2021 to FY 2022 Increase/Decrease Statement: Project ends in FY21	0.693	0.410	-	-	-
Title: Replenishment from Ships to Point of Need Delivery Description: Unmanned system launched from ships and capable of carrying supplies up to 100 miles inland. FY 2021 Plans: Development of technologies to support required payloads and distances FY 2022 Base Plans: Development of technologies to support required payloads and distances FY 2021 to FY 2022 Increase/Decrease Statement: Development varies by year	0.475	0.750	1.350	-	1.350
Title: Use of Dual Row Airdrop System with Joint Light Tactical Vehicle Description: Increasing the strength of C-17 dual row rails to enable dropping the JLTV FY 2021 Plans: Applying technologies and testing results FY 2022 Base Plans: Applying technologies and testing results FY 2021 to FY 2022 Increase/Decrease Statement:	0.030	0.275	1.025	-	1.025

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0604776F / <i>Deployment & Distribution Enterprise R&D</i>	Project (Number/Name) 640211 / <i>GLOBAL ACCESS</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Development varies by FY					
<p>Title: Enhanced Vision Navigation for Joint Precision Airdrop System (Supports FY17 AAIRDUCT JCTD)</p> <p>Description: Advanced technologies to improve airdrop capabilities to the warfighter.</p> <p>FY 2021 Plans: Program support requirements</p> <p>FY 2022 Base Plans: Program support requirements</p> <p>FY 2021 to FY 2022 Increase/Decrease Statement: No significant change</p>	0.505	0.130	0.515	-	0.515
<p>Title: Expeditionary End-to-End Fueling Concept</p> <p>Description: Addressing gap in theater fuel delivery/distribution capabilities to inform the development of the Army Early Entry Fluid Distribution System as well as provide a development path for Navy/USMC ship-to-shore capabilities.</p> <p>FY 2021 Plans: Continue over the shore fueling development</p> <p>FY 2022 Base Plans: N/A</p> <p>FY 2021 to FY 2022 Increase/Decrease Statement: Project ends in FY21</p>	1.000	0.150	0.000	-	0.000
<p>Title: Advanced Planning for Global Response Force Mission</p> <p>Description: Create and leverage analytical and visual tools to provide planners the ability to streamline GRF missions, integrating aircraft load planning with sophisticated airdrop mission simulations.</p> <p>FY 2021 Plans: No effort in 2021</p> <p>FY 2022 Base Plans:</p>	0.900	0.000	0.000	-	0.000

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force				Date: May 2021	
Appropriation/Budget Activity 3600 / 4		R-1 Program Element (Number/Name) PE 0604776F / <i>Deployment & Distribution Enterprise R&D</i>		Project (Number/Name) 640211 / <i>GLOBAL ACCESS</i>	
B. Accomplishments/Planned Programs (\$ in Millions)					
	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
N/A					
<p>Title: Autonomous Drone Delivery from Airdrop Systems</p> <p>Description: An air-droppable Unmanned Aircraft System (UAS) to conduct resupply missions in densely populated urban areas.</p> <p>FY 2021 Plans: continued development and testing</p> <p>FY 2022 Base Plans: N/A</p> <p>FY 2021 to FY 2022 Increase/Decrease Statement: Project ends in FY21</p>	0.850	0.220	0.000	-	0.000
<p>Title: Mini Robotic Dredge</p> <p>Description: Prototype a tactical dredging capability to deepen an usable port facility</p> <p>FY 2021 Plans: No effort in 2021</p> <p>FY 2022 Base Plans: N/A</p>	0.624	0.000	0.000	-	0.000
<p>Title: Optimized HALO Delivery using Probablistic Airdrop Planner</p> <p>Description: A low-cost, low-complexity solution to deliver payloads at improved accuracy, compared to standard ballistic parachutes, but without the expensive parafoil and guidance systems</p> <p>FY 2021 Plans: no effort in 2021</p> <p>FY 2022 Base Plans: N/A</p>	0.268	0.000	0.000	-	0.000
<p>Title: Expedient and Expeditionary Airfield Damage Repair</p>	0.500	0.000	0.000	-	0.000

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0604776F / <i>Deployment & Distribution Enterprise R&D</i>	Project (Number/Name) 640211 / <i>GLOBAL ACCESS</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
<p>Description: Provide a truly expeditionary, indigenous-material based repair capability to support high pace, aircraft sortie generation, recovery and egress</p> <p>FY 2021 Plans: No effort in 2021</p> <p>FY 2022 Base Plans: N/A</p>					
<p>Title: Resilient Expeditionary Agile Littoral Logistics</p> <p>Description: Transfer of fuel ashore from various conveyances from off-shore platform</p> <p>FY 2021 Plans: Technology development of fuel transfer</p> <p>FY 2022 Base Plans: Technology development of fuel transfer</p> <p>FY 2021 to FY 2022 Increase/Decrease Statement: Development varies by FY</p>	0.250	0.250	1.000	-	1.000
Accomplishments/Planned Programs Subtotals	7.493	5.633	9.484	-	9.484

C. Other Program Funding Summary (\$ in Millions)

N/A

Remarks

D. Acquisition Strategy

Requirements for joint deployment and distribution enterprise technology enhancements are annually identified, validated and prioritized by the Joint Deployment & Distribution Enterprise (JDDE) community. Pursuit of the development of new capabilities to meet these requirements is managed by the United States Transportation Command (USTRANSCOM). Prototype products, once evaluated by the users, are spirally transitioned by the operational community.

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Exhibit R-4, RDT&E Schedule Profile: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0604776F / <i>Deployment & Distribution Enterprise R&D</i>	Project (Number/Name) 640211 / <i>GLOBAL ACCESS</i>

FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

<i>Deployment and Distribution</i>	
Integrated Logistics Support	

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Exhibit R-4A, RDT&E Schedule Details: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0604776F / <i>Deployment & Distribution Enterprise R&D</i>	Project (Number/Name) 640211 / <i>GLOBAL ACCESS</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>Deployment and Distribution</i>				
Integrated Logistics Support	1	2020	4	2026

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force										Date: May 2021		
Appropriation/Budget Activity 3600 / 4					R-1 Program Element (Number/Name) PE 0604776F / <i>Deployment & Distribution Enterprise R&D</i>				Project (Number/Name) 640212 / <i>C2/OPTIMIZATION/MODELING AND SIMULATION</i>			
COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
640212: <i>C2/OPTIMIZATION/MODELING AND SIMULATION</i>	-	14.767	14.726	24.958	0.000	24.958	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

This program, BA 4, PE 0604776F, project 640212, Joint Transportation Management System, is a new start.
 This program, BA 4, PE 0604776F, project 640212, Ares Dynamic Network Automation, is a new start.
 This program, BA 4, PE 0604776F, project 640212, Resilient Logistics JCTD, is a new start.
 This program, BA 4, PE 0604776F, project 640212, Safety Analysis of Modified Midwest Guardrail, is a new start.
 This program, BA 4, PE 0604776F, project 640212, Aerial Delivery and Autonomous Deployment of Unmanned Vehicles, is a new start.

A. Mission Description and Budget Item Justification

This program provides for the development, integration, demonstration and detailed assessment of capabilities which improve deployment, distribution and supply chain decision-making/collaboration (e.g., planning stage to real-time execution/retrograde operations) without need for highly specialized operators. Projects in this area address the following: decision support tools, distribution process simulations/analytics, distribution demand forecasting/execution monitoring, automated decision-maker support (e.g., queuing, alerting, courses of action), automated status monitoring with information fusion to include drilldown capability, and resilient Command & Control (C2) infrastructure capabilities. Current planning, forecasting, and collaboration capabilities do not permit full synchronization of people, processes and assets to execute planned operations. Automated tools must be able to dynamically analyze/predict demand and provide input to advanced distribution planning systems to include the capability for Combatant Commanders to manage theater transportation operations from the port of debarkation to the point of need. Transportation information exchange across the DOD is inhibited by disparate systems, multiple data standards and insufficient interfaces. The ability to rapidly determine the impact of any delays/changes and conduct "what-if" impact assessments on the closure of force packages is required. This project addresses the required mission support to combatant commanders and other customers in the area of C2, Optimization, and Modeling and Simulations. The Joint Transportation Management System (JTMS) will develop and configure a commercial-off-the-shelf (COTS) transportation/financial management product to deliver DoD enterprise-wide end-to-end transportation and transportation-related financial business process reform.

B. Accomplishments/Planned Programs (\$ in Millions)

	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Title: TRANSCOM Innovation	2.477	5.389	3.266	-	3.266
Description: Rapidly develop and integrate technology solutions for the enterprise					
FY 2021 Plans:					

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force			Date: May 2021		
Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0604776F / <i>Deployment & Distribution Enterprise R&D</i>	Project (Number/Name) 640212 / <i>C2/OPTIMIZATION/MODELING AND SIMULATION</i>			
B. Accomplishments/Planned Programs (\$ in Millions)					
	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Continue to pursue and develop solutions to identified challenges FY 2022 Base Plans: Continue to pursue and develop solutions to identified challenges FY 2021 to FY 2022 Increase/Decrease Statement: Development varies by FY					
Title: Joint Transportation Management System Description: JTMS will develop and configure a commercial-off-the-shelf (COTS) transportation/financial management product to deliver DoD enterprise-wide end-to-end transportation and transportation-related financial business process reform. FY 2021 Plans: FY22 New Start FY 2022 Base Plans: JTMS will develop and configure a commercial-off-the-shelf (COTS) transportation/financial management product to deliver DoD enterprise-wide end-to-end transportation and transportation-related financial business process reform. FY 2021 to FY 2022 Increase/Decrease Statement: FY22 New Start	-	0.000	15.300	-	15.300
Title: Ares Dynamic Network Automation Description: Support plans that are released on unclassified, untrusted commercial networks in order to solicit and contract with vendors capable of supplying theater forces. FY 2022 Base Plans: Permissioned transactional blockchain network integrated with an identity blockchain that controls access FY 2021 to FY 2022 Increase/Decrease Statement: FY22 New Start	-	-	0.891	-	0.891
Title: Resilient Logistics JCTD	-	0.000	0.200	-	0.200

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0604776F / <i>Deployment & Distribution Enterprise R&D</i>	Project (Number/Name) 640212 / <i>C2/OPTIMIZATION/MODELING AND SIMULATION</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
<p>Description: Deliver logistical deception kits to confuse and deny enemy Intelligence, Surveillance, Reconnaissance (ISR)</p> <p>FY 2021 Plans: FY22 New Start</p> <p>FY 2022 Base Plans: Develop deception kits</p> <p>FY 2021 to FY 2022 Increase/Decrease Statement: FY22 New Start</p>					
<p>Title: Air Refueling Optimization</p> <p>Description: System managing the various phases of the Air Refueling (AR) fleet management, validation, allocation and execution process.</p> <p>FY 2021 Plans: Develop opportunities that our current air refueling planning systems lack: optimization algorithms that provide a range of strategic decision space</p> <p>FY 2022 Base Plans: Continue development of opportunities that our current A/R planning systems lack: optimization algorithms that provide a range of strategic decision space</p> <p>FY 2021 to FY 2022 Increase/Decrease Statement: Development varies each year</p>	-	0.600	0.200	-	0.200
<p>Title: Safety Analysis of Modified Midwest Guardrail</p> <p>Description: Research and physical testing to gather and analyze data for improving Entry Control Facilities (ECF) design and operations, improve road safety on installations, and reduce overall costs</p> <p>FY 2021 Plans: FY22 New Start</p> <p>FY 2022 Base Plans:</p>	-	0.000	0.700	-	0.700

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0604776F / <i>Deployment & Distribution Enterprise R&D</i>	Project (Number/Name) 640212 / <i>C2/OPTIMIZATION/MODELING AND SIMULATION</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Establish entry control facilities ECF guardrail standards to mitigate terrorism/asymmetric threats FY 2021 to FY 2022 Increase/Decrease Statement: FY22 New Start					
Title: Data Lake Description: Develop and demonstrate the capability that allows incongruent data to be brought together to provide automated decision support. FY 2021 Plans: Continue data analytics development FY 2022 Base Plans: Continue data analytics development FY 2021 to FY 2022 Increase/Decrease Statement: Development varies by FY	1.058	0.372	0.475	-	0.475
Title: End-to-End Deployment and Distribution Modeling Description: Provide an integrated deployment/distribution environment to provide continuous and optimal balancing of total demand verse capacity from planning through mission execution. FY 2021 Plans: Increase analytical capability for DoD programmatic studies and analysis FY 2022 Base Plans: N/A FY 2021 to FY 2022 Increase/Decrease Statement: Requirements decreased	2.500	2.300	0.300	-	0.300
Title: Massachusetts Institute of Technology Lincoln Labs Description: Partnership with MIT-LL to research efforts to improve enterprise operational architecture supporting high-end analytics, integrated information technology/data structures, understanding of cloud capabilities and multi-level cyber security defense. FY 2021 Plans:	3.190	3.367	0.371	0.000	0.371

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force			Date: May 2021		
Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0604776F / <i>Deployment & Distribution Enterprise R&D</i>	Project (Number/Name) 640212 / <i>C2/OPTIMIZATION/MODELING AND SIMULATION</i>			
B. Accomplishments/Planned Programs (\$ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Continue effective secure operations enabled via data fusion frameworks and prototypes. FY 2022 Base Plans: Continue effective secure operations enabled via data fusion frameworks and prototypes. FY 2022 OCO Plans: N/A FY 2021 to FY 2022 Increase/Decrease Statement: Development varies by year.					
Title: Modeling & Simulation Innovation Description: Select student research/faculty-assisted projects (e.g., Joint Transportation Asset Scheduling Kit, Next Generation Cargo Capability, Applying Post Modern Portfolio Theory to Mitigate Risk in International Shipping, Optimal CH-47/C-130 Workload Balance, Remotely Piloted Aircraft Performing Airdrop Mission). FY 2021 Plans: Collaboration partnership with AFIT for student research FY 2022 Base Plans: Collaboration partnership with AFIT for student research FY 2021 to FY 2022 Increase/Decrease Statement: Modeling & Simulation varies by year.	0.125	0.125	0.125	-	0.125
Title: Infrastructure Information Confidence Model Description: Inform decision makers of the quality of primary and alternate data sources they are using to make decisions FY 2021 Plans: Continue development of information collaboration process that analyzes and provides a confidence assessment of structured and unstructured data FY 2022 Base Plans: N/A FY 2021 to FY 2022 Increase/Decrease Statement:	1.137	0.697	0.000	-	0.000

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force			Date: May 2021		
Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0604776F / <i>Deployment & Distribution Enterprise R&D</i>	Project (Number/Name) 640212 / <i>C2/OPTIMIZATION/MODELING AND SIMULATION</i>			
B. Accomplishments/Planned Programs (\$ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Project ends in FY21					
Title: Aerial Delivery and Autonomous Deployment of Unmanned Vehicles Description: Develop ability to deliver unmanned systems from existing airdrop systems FY 2021 Plans: FY22 New Start FY 2022 Base Plans: Aerial Delivery and Autonomous Deployment of Unmanned Vehicles FY 2021 to FY 2022 Increase/Decrease Statement: FY22 New Start	-	0.000	1.392	-	1.392
Title: Program Execution Description: Provide technical assistance and program management support to the USTRANSCOM RDT&E Program. FY 2021 Plans: TRL 4-6: Program support to explore technology solutions to capability gaps identified through Joint Concept Development documents, the Joint capabilities Integration and Development System process, Joint Experimentation, etc, to increase the responsiveness, efficiency and effectiveness of the Joint Deployment and Distribution Enterprise. FY 2022 Base Plans: TRL 4-6: Program support to explore technology solutions to capability gaps identified through Joint Concept Development documents, the Joint capabilities Integration and Development System process, Joint Experimentation, etc, to increase the responsiveness, efficiency and effectiveness of the Joint Deployment and Distribution Enterprise. FY 2021 to FY 2022 Increase/Decrease Statement: Technical assistance varies by year.	1.006	0.976	1.138	-	1.138
Title: Scheduling Mobility Aircrews for Readiness and Transportation Description: Develop prototype software for advanced squadron scheduling, collaboration, and predictive modeling.	1.950	0.600	0.600	-	0.600

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0604776F / <i>Deployment & Distribution Enterprise R&D</i>	Project (Number/Name) 640212 / <i>C2/OPTIMIZATION/MODELING AND SIMULATION</i>

C. Other Program Funding Summary (\$ in Millions)

Remarks

D. Acquisition Strategy

Requirements for joint deployment and distribution enterprise technology enhancements are annually identified, validated and prioritized by the Joint Deployment & Distribution Enterprise (JDDE) community. Pursuit of the development of new/improved capabilities to meet these requirements is managed by the United States Transportation Command (USTRANSCOM). Prototype products, once evaluated by the users, are spirally transitioned by the operational community.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0604776F / <i>Deployment & Distribution Enterprise R&D</i>	Project (Number/Name) 640212 / <i>C2/OPTIMIZATION/MODELING AND SIMULATION</i>
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Support (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Integrated Logistics Support	Various	Various : Belleville, IL	-	14.767	Nov 2019	14.726	Nov 2020	24.958	Nov 2021	-		24.958	-	-	-
Subtotal			-	14.767		14.726		24.958		-		24.958	-	-	N/A

Remarks
Funds will be realigned within PE.

	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	-	14.767	14.726	24.958	-	24.958	-	-	N/A

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0604776F / <i>Deployment & Distribution Enterprise R&D</i>	Project (Number/Name) 640212 / <i>C2/OPTIMIZATION/MODELING AND SIMULATION</i>

	FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

<i>Deployment and Distribution</i>																												
Integrated Logistics Support																												

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Exhibit R-4A, RDT&E Schedule Details: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0604776F / <i>Deployment & Distribution Enterprise R&D</i>	Project (Number/Name) 640212 / <i>C2/OPTIMIZATION/MODELING AND SIMULATION</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>Deployment and Distribution</i>				
Integrated Logistics Support	1	2020	4	2026

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0604776F / <i>Deployment & Distribution Enterprise R&D</i>	Project (Number/Name) 640213 / <i>CYBER</i>
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COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
640213: <i>CYBER</i>	-	5.358	5.429	5.461	0.000	5.461	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-	-	-

A. Mission Description and Budget Item Justification

This program provides for the development, integration, demonstration and detailed assessment of capabilities to ensure USTRANSCOM mission assurance is in a persuasive/dynamic cyber environment. USTRANSCOM requires the procedures/technologies to improve cyber surveillance and control of networks across multiple domains and the ability to continue critical network operations in contested unclassified and classified network environments. The Command also needs the ability to differentiate between valid/unauthorized users and determine/quantify the trustworthiness of hardware/software systems. Additionally USTRANSCOM must have the ability to rapidly analyze & correlate data regarding malicious activities, select/evoke real-time defense actuators, perform automated reasoning capabilities that address data quality issues, and the ability to rapidly return to a known/safe operating state.

B. Accomplishments/Planned Programs (\$ in Millions)

	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
<p>Title: Oversight</p> <p>Description: Enable continuous tracking of adversary cyber groups and campaigns targeting USTRANSCOM and USINDOPACOM enterprise and their partners</p> <p>FY 2022 Base Plans: Provide anomaly detection and predictive analysis to dynamically assess threats, attack vectors and adversary intent</p> <p>FY 2021 to FY 2022 Increase/Decrease Statement: FY22 New Start</p>	-	-	1.330	-	1.330
<p>Title: Cyber Mission Assurance Technologies</p> <p>Description: Near real-time understanding of the operational impact of cyber risks, threats, and disruptions.</p> <p>FY 2022 Base Plans: Develop integrated analysis/decision processes involving complex ops/cyber data by selecting pre-approved actions and coordinating stakeholders in the fight-through of cyber risks/disruptions to executing missions and Cyber Critical Asset Lists</p> <p>FY 2021 to FY 2022 Increase/Decrease Statement:</p>	-	-	1.177	-	1.177

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0604776F / <i>Deployment & Distribution Enterprise R&D</i>	Project (Number/Name) 640213 / <i>CYBER</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
FY22 New Start					
Title: Lincoln Labs	5.358	5.429	2.954	-	2.954
Description: Partnership with MIT-LL to research efforts to improve enterprise operational architecture supporting high-end analytics, integrated information technology/data structures, understanding of cloud capabilities and multi-level cyber security defense.					
FY 2021 Plans: Continue increased awareness and ability to respond to cyber events					
FY 2022 Base Plans: Continue increased awareness and ability to respond to cyber events					
FY 2021 to FY 2022 Increase/Decrease Statement: Project varies by year.					
Accomplishments/Planned Programs Subtotals	5.358	5.429	5.461	-	5.461

C. Other Program Funding Summary (\$ in Millions)

N/A

Remarks

D. Acquisition Strategy

Requirements for joint deployment and distribution enterprise technology enhancements are annually identified, validated and prioritized by the Joint Deployment & Distribution Enterprise (JDDE) community. Pursuit of the development of new/improved capabilities to meet these requirements is managed by the United States Transportation Command (USTRANSCOM). Prototype products, once evaluated by the users, are spirally transitioned by the operational community.

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Exhibit R-4, RDT&E Schedule Profile: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0604776F / <i>Deployment & Distribution Enterprise R&D</i>	Project (Number/Name) 640213 / <i>CYBER</i>

FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

<i>Deployment and Distribution</i>	
Integrated Logistics Support	

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Exhibit R-4A, RDT&E Schedule Details: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0604776F / <i>Deployment & Distribution Enterprise R&D</i>	Project (Number/Name) 640213 / <i>CYBER</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>Deployment and Distribution</i>				
Integrated Logistics Support	1	2020	4	2025

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0604776F / <i>Deployment & Distribution Enterprise R&D</i>	Project (Number/Name) 640215 / <i>Transportation Management Service</i>
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COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
640215: <i>Transportation Management Service</i>	-	0.000	0.000	0.200	0.000	0.200	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-	-	-

Note

This program, BA 4, PE 0604776F, project , Transportation Financial Product Development, is a new start.

Joint Transportation Management Systems (JTMS) added to support FY22 development.

A. Mission Description and Budget Item Justification

JTMS will develop and configure a commercial-off-the-shelf (COTS) transportation/financial management product to deliver DoD enterprise-wide end-to-end transportation and transportation-related financial business process reform.

B. Accomplishments/Planned Programs (\$ in Millions)

	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Title: Transportation Financial Product Development	0.000	0.000	0.200	-	0.200
Description: JTMS will develop and configure a commercial-off-the-shelf (COTS) transportation/financial management product to deliver DoD enterprise-wide end-to-end transportation and transportation-related financial business process reform.					
FY 2021 Plans: FY22 New Start					
FY 2022 Base Plans: Develop a transportation-related financial business process reform.					
FY 2021 to FY 2022 Increase/Decrease Statement: FY22 New Start					
Accomplishments/Planned Programs Subtotals	0.000	0.000	0.200	-	0.200

C. Other Program Funding Summary (\$ in Millions)

N/A

Remarks

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0604776F / <i>Deployment & Distribution Enterprise R&D</i>	Project (Number/Name) 640215 / <i>Transportation Management Service</i>

D. Acquisition Strategy

Reforms the Defense Transportation System (DTS) by integrating financial and transportation transactions at the transactional level to effectively manage resources through a transportation requirement's plan to pay lifecycle. Program will improve resource management and budgeting accuracy, maximize buying power, strengthen financial management decision-making, and improve the Department's effort to achieve auditability.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0604776F / <i>Deployment & Distribution Enterprise R&D</i>	Project (Number/Name) 640215 / <i>Transportation Management Service</i>
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Support (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Integrated Logistics Support	Various	Belleville, IL : IL	-	-		-		0.200	Nov 2021	-		0.200	-	-	-
Subtotal			-	-		-		0.200		-		0.200	-	-	N/A
Project Cost Totals			-	-		0.000		0.200		-		0.200	-	-	N/A

Remarks
DoD enterprise end-to-end transportation and transportation-related financial business process reform.

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Exhibit R-4, RDT&E Schedule Profile: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0604776F / <i>Deployment & Distribution Enterprise R&D</i>	Project (Number/Name) 640215 / <i>Transportation Management Service</i>

	FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

<i>Integrated Logistics Support</i>	
Develop Transportation Products and Processes	

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Exhibit R-4A, RDT&E Schedule Details: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0604776F / <i>Deployment & Distribution Enterprise R&D</i>	Project (Number/Name) 640215 / <i>Transportation Management Service</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>Integrated Logistics Support</i>				
Develop Transportation Products and Processes	1	2022	4	2026

Note
DoD enterprise end-to-end transportation and transportation-related financial business process reform.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 0604858F / <i>Tech Transition Program</i>
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COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
Total Program Element	-	322.793	305.943	343.545	0.000	343.545	-	-	-	-	-	-
640858: <i>AFWERX Prime</i>	-	0.000	0.000	57.467	0.000	57.467	-	-	-	-	-	-
645350: <i>Experimentation</i>	-	194.665	203.772	81.383	0.000	81.383	-	-	-	-	-	-
645351: <i>Prototyping</i>	-	128.128	102.171	204.695	0.000	204.695	-	-	-	-	-	-

A. Mission Description and Budget Item Justification

The Tech Transition Program addresses the gap between initial system-level technology or concept development and demonstration, and successful acquisition and operational capability implementation. This program utilizes multiple approaches and integrated activities to field technology for the warfighter. First, the Tech Transition Program reduces risk in emerging technology markets by partnering with industries through Prime investments and providing access to Government analysis, testing and certification capabilities. Prime investments focus on Government-Industry partnerships to influence and militarize emerging commercial capabilities to ensure US competitive advantage in key technology areas. The Tech Transition Program also matures new warfighting concepts, to rapidly develop fieldable prototypes, and for experimentation to assess military utility of transition-ready weapon systems. Following the guidance laid out in the National Defense Strategy the Department of the Air Force has institutionalized Experimentation and Prototyping to achieve smarter, faster, and more efficient acquisitions that move technologies rapidly into the most critical warfighting capabilities. Experimentation explores new concepts and their applications in potential future operating environments within a system-of-systems context taking risks early in the acquisition process to drive a more optimized and efficient acquisition process significantly reducing overall acquisitions costs. Prototyping enables integration and demonstration of emerging technologies to quickly move them into warfighting capability. The Tech Transition Program allows acquisition program managers (the capability developers) and warfighters (the capability recipients and end users) to prototype, integrate, and demonstrate candidate technologies and assess them in an operational system of systems environment in partnership with Combatant Commanders, Major and Field Commands, Program Executive Officers, schoolhouses, simulation facilities, and development planning organizations.

This program element may include necessary emergent or unanticipated civilian pay expenses required to manage, execute, and deliver Technology Transition for emergent or unanticipated weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program element 0605831F.

This effort is in Budget Activity 4, Advanced Component Development and Prototypes (ACD&P), because efforts are necessary to evaluate integrated technologies, representative modes or prototype systems in a high fidelity and realistic operating environment.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 0604858F / <i>Tech Transition Program</i>
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B. Program Change Summary (\$ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Previous President's Budget	314.926	219.252	259.128	0.000	259.128
Current President's Budget	322.793	305.943	343.545	0.000	343.545
Total Adjustments	7.867	86.691	84.417	0.000	84.417
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	-70.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	157.250			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	-10.453	0.000			
• Other Adjustments	18.320	-0.559	84.417	0.000	84.417

Congressional Add Details (\$ in Millions, and Includes General Reductions)

Project: 645350: *Experimentation*

- Congressional Add: *Program Increase - Low Cost Attributable Aircraft Technology*
- Congressional Add: *Program increase - small business research for rocket technology*
- Congressional Add: *Program Increase - Directed Energy Experimentation*
- Congressional Add: *Program Increase - Autonomous Air Combat Operations*
- Congressional Add: *Program Increase - Cold Spray and Directed Energy Deposition*
- Congressional Add: *Program Increase - Arctic Communications*
- Congressional Add: *Program Increase - Massive Area Additive Manufacturing*
- Congressional Add: *Program Increase - Additive Manufacturing for Metals*

Congressional Add Subtotals for Project: 645350

	FY 2020	FY 2021
	96.706	50.000
	0.000	2.500
	4.835	0.000
	0.000	5.000
	0.000	6.000
	0.000	50.000
	0.000	10.000
	0.000	10.000
Congressional Add Subtotals for Project: 645350	101.541	133.500
	19.341	0.000
	5.802	0.000
	24.122	0.000
	4.835	8.750
	7.736	0.000

Project: 645351: *Prototyping*

- Congressional Add: *Program Increase - Rapid Sustainment Office*
- Congressional Add: *Program Increase - Reliable Power for Critical Infrastructure*
- Congressional Add: *Program Increase - Agility Prime*
- Congressional Add: *Program Increase - Logistics Technologies*
- Congressional Add: *Program Increase - Small Satellite Manufacturing*

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force	Date: May 2021
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Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 0604858F / <i>Tech Transition Program</i>
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Congressional Add Details (\$ in Millions, and Includes General Reductions)	FY 2020	FY 2021
Congressional Add: <i>Program Increase - Additive Manufacturing</i>	9.671	0.000
Congressional Add: <i>Program Increase - Heavy Payload Solar Powered UAS JCTC</i>	0.000	15.000
Congressional Add Subtotals for Project: 645351	71.507	23.750
Congressional Add Totals for all Projects	173.048	157.250

Change Summary Explanation

FY 2022 funding increased compared to FY 2021 by 84.417M. Funding increased due to the addition of AFWERX Prime effort, and increased requirements for system prototyping including Base Defense, Palletized Munitions, Operational Energy efforts, Regional Operating Picture, and Watchtower Initiatives.

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force										Date: May 2021		
Appropriation/Budget Activity 3600 / 4					R-1 Program Element (Number/Name) PE 0604858F / <i>Tech Transition Program</i>				Project (Number/Name) 640858 / <i>AFWERX Prime</i>			
COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
640858: <i>AFWERX Prime</i>	-	0.000	0.000	57.467	0.000	57.467	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

AFWERX Prime is a new acquisition approach that uses government-specific resources to reduce risk in emerging technology markets while partnering with investors, industry, interagency, and international partners for accelerated, affordable, and agile commercial and military capability. These Prime efforts are led by a Chief Commercialization Officer whose key responsibility is to accelerate technology commercialization for fielding of military capability. Agility Prime is the first effort in the series and will provide research, development, testing, and evaluation to field transformative vertical flight technology in 2023. These systems may incorporate non-traditional electric or hybrid propulsion for manned or optionally manned missions, with onboard, remote, or eventually autonomous control. Agility Prime will leverage commercial investment in technologies that support mobility and sustainment in benign or contested environments to enable agile, lower-cost distributed logistics, humanitarian operations, or disaster response operations. AFWERX Prime will also explore associated technologies and potential follow-on Prime initiatives. Future Prime initiatives will use the same paradigm to leverage commercial technology and investment for high returns on government participation in this sector, achieving advanced, agile, and accelerated fielding of commercial and military capability bolstering national security and domestic technological dominance.

NOTE: This is a continuation of a FY 2021 congressional add titled Agility Prime in PE 0603211F Aerospace Technology Development and Demonstration, Project 634920 Flight Vehicle Tech Integration. This effort was moved to PE 0604858F, new BPAC 0604858F AFWERX Prime due to maturation of technology and in order to better align Department of the Air Force objectives across appropriate PEs. This is not a new start.

This program element may include necessary emergent or unanticipated civilian pay expenses required to manage, execute, and deliver Tech Transition - AFWERX Prime for emergent or unanticipated weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program element 0605831F.

B. Accomplishments/Planned Programs (\$ in Millions)

	FY 2020	FY 2021	FY 2022
Title: Agility Prime	-	0.000	57.467
Description: Execution of efforts to explore and transition emerging dual-use technologies under this new acquisition approach to include prep to field transformative vertical flight and enabling technologies. Activities include technical exchanges, research, development, certification, testing, and evaluation.			
FY 2021 Plans: N/A			
FY 2022 Plans: Continue risk reduction ground testing with multiple aircraft manufacturers including wind tunnel, environmental, cyber penetration, and Electromagnetic Interference characterization. Continue prototype testing to characterize performance, handling qualities,			

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force	Date: May 2021
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Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0604858F / <i>Tech Transition Program</i>	Project (Number/Name) 640858 / <i>AFWERX Prime</i>
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B. Accomplishments/Planned Programs (\$ in Millions)	FY 2020	FY 2021	FY 2022
and mission system effectiveness. Continue airworthiness assessments aimed at providing flight certified vehicles in 2023. Initiate flight tests in realistic operating environments and scenarios to provide data for business case analysis and fielding. Initial research, development, testing, and evaluation of other potential technology sectors to follow this Prime acquisition paradigm.			
<i>FY 2021 to FY 2022 Increase/Decrease Statement:</i> FY 2022 funding increased compared to FY 2021 by \$57.467 million. Funding increased due to creation of BPAC and commencement of AFWERX Prime efforts. Previous Agility Prime work was funded as a congressional add in PE 0603211F Aerospace Technology Dev/Demo.			
Accomplishments/Planned Programs Subtotals	-	0.000	57.467

C. Other Program Funding Summary (\$ in Millions)

N/A

Remarks

D. Acquisition Strategy

This effort will proceed along the following path: 1) investigate details regarding potential commercial markets; 2) identify technologies that are likely to result in successful prototypes; 3) create collaborative test plans potentially offering test assets and expertise; 4) leverage this campaign for near-term airworthiness as well as preparation for procurement of hardware, software, data, or services. The intent is to accelerate learning to enable early adoption, procurement, and fielding. This is the process currently being executed under Agility Prime and would be continued under other future Prime initiatives.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0604858F / Tech Transition Program	Project (Number/Name) 640858 / AFWERX Prime
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Product Development (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
AOI 1 PERFORMER A	Reqn	Various : Various	-	-		-		12.000	Oct 2021	-		12.000	-	-	-
AOI 2 Performer A	Reqn	Various : Various	-	-		-		3.000	Nov 2021	-		3.000	-	-	-
AOI 1 Performer B	Reqn	Various : Various	-	-		-		6.000	Jan 2022	-		6.000	-	-	-
AOI 2 Performer B	Reqn	Various : Various	-	-		-		4.000	Feb 2022	-		4.000	-	-	-
AOI 3 Performer A	Reqn	Various : Various	-	-		-		3.000	Dec 2021	-		3.000	-	-	-
AOI 3 Performer B	Reqn	Various : Various	-	-		-		4.000	Mar 2022	-		4.000	-	-	-
Air Race Partners	RO	Various : Various	-	-		-		5.000	Jun 2022	-		5.000	-	-	-
Subtotal			-	-		-		37.000		-		37.000	-	-	N/A

Support (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Modeling and Analytics Support	MIPR	Various : Various	-	-		-		2.000	Nov 2021	-		2.000	-	-	-
Government Test Support	WR	Various : Various	-	-		-		2.000	Dec 2021	-		2.000	-	-	-
Airworthiness and Test Support	Various	Various : Various	-	-		-		3.000	Nov 2021	-		3.000	-	-	-
Subtotal			-	-		-		7.000		-		7.000	-	-	N/A

Test and Evaluation (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Autonomy And Hybrid Stratfi	MIPR	Various : Various	-	-		-		5.000	Dec 2021	-		5.000	-	-	-
Autonomy and Hybrid Stratfi (2)	MIPR	Various : Various	-	-		-		5.000	Feb 2022	-		5.000	-	-	-
Subtotal			-	-		-		10.000		-		10.000	-	-	N/A

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Exhibit R-4A, RDT&E Schedule Details: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0604858F / <i>Tech Transition Program</i>	Project (Number/Name) 640858 / <i>AFWERX Prime</i>
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Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>AFWERX Prime Product Development</i>				
Innovative Capability Opening (Air Race)	1	2022	4	2022
Air Force Airworthiness Assessments (Part 1)	1	2022	3	2022
Air Force Airworthiness Assessments (Part 2)	2	2023	3	2023
Air Force Airworthiness Release	3	2022	3	2022
Federal Aviation Administration Certification	1	2023	1	2023
Department of Defense Airworthiness Certification	4	2023	4	2023
First Air Force Manned Flights	1	2022	1	2022
Site Surveys	1	2022	1	2022
Bed-down Planning	2	2022	4	2022
Base Support Agreements	1	2023	1	2023
Bed-down	3	2023	3	2023

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force										Date: May 2021		
Appropriation/Budget Activity 3600 / 4					R-1 Program Element (Number/Name) PE 0604858F / <i>Tech Transition Program</i>				Project (Number/Name) 645350 / <i>Experimentation</i>			
COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
645350: <i>Experimentation</i>	-	194.665	203.772	81.383	0.000	81.383	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Experimentation project funds experimentation campaigns to explore new concepts and their applications in operationally relevant environments and within a system-of-systems warfighting context. Concepts and enabling technologies including but not limited to, autonomy, artificial intelligence, machine learning, directed energy weapons, and joint all-domain operations hold great promise, yet their transition to acquisition programs and fielded capabilities is typically hampered due to uncertainties regarding their military utility and organizational adoption. Experimentation campaigns assess hypotheses that new capabilities will deliver decisive competitive advantage against our adversaries in a dynamic threat environment. These campaigns dramatically shorten the acquisition process by delivering robust information including total life cycle cost estimates, preliminary product support strategy, reliability and maintainability metrics, operational utility assessments and Doctrine, Organization, Training, Materiel, Leadership and Education, Personnel, Facilities and Policy implications. A key element of the experimentation campaigns is strong stakeholder partnerships and buy-in from Air Force Futures, Air Force Plans and Programs, US Space Force Futures and Integration, Office of the Assistant Secretary of the Air Force for Acquisition, Technology and Logistics, warfighting Major Commands (capability recipients/end users), Space and Missile Systems Center and Air Force Materiel Command (capability developers) that ensures rapid transition of capabilities when operational utility, affordability, sustainability, and industrial capacity meet the Department of Air Force needs. Experimentation campaigns are centered on an operational level warfighting concept to provide context for assessment, and use wargaming, simulation, demonstrations, and field/flight experimentation to evolve, refine, and validate the warfighting concepts leading to solid, evidence-based materiel and non-materiel capability development approaches with associated recommendations. Experimentation campaigns improve the effectiveness of operations by refining concepts and generating new information to address challenging threats of the future which aids the fielding of advanced technologies by providing the credible evidence needed to make sound strategic decisions and investment choices. Warfighting concepts evolve based on the latest threat assessments and the Experimentation Campaigns are likewise modified to ensure the Department of the Air Force retains a competitive advantage. Experimentation is focused on rapid learning and then pivoting existing or future capability development efforts based on that knowledge to ensure the most pressing operational gaps are addressed and our warfighting advantages are preserved. Further details can be provided in the appropriate forum.

This program element may include necessary emergent or unanticipated civilian pay expenses required to manage, execute, and deliver Tech Transition - Experimentation for emergent or unanticipated weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program element 0605831F.

B. Accomplishments/Planned Programs (\$ in Millions)

	FY 2020	FY 2021	FY 2022
Title: Experimentation Campaigns	93.124	70.272	81.383
Description: Execution of Experimentation Campaigns to identify the competitive advantages of operational warfighting concepts and the technologies that enable these concepts. Activities may include flight tests, operational exercises, digital engineering, system-of-systems integration facilitated workshops, wargaming, modeling and simulation, and virtual and hardware prototyping to enable experimentation campaigns.			

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0604858F / <i>Tech Transition Program</i>	Project (Number/Name) 645350 / <i>Experimentation</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2020	FY 2021	FY 2022
<p><i>FY 2021 Plans:</i> Continue the Experimentation Campaigns will focus on evaluating the operational utility and competitive advantages of: targeting-as-a-service to support long range kill chains, layered base defense including kinetic and directed energy weapon systems that provide defense for forward deployed bases against adversary attack, alternate Position, Navigation, and Timing systems that are capable of functioning in GPS-denied environments, Autonomous, Attritable, Aircraft employed in mass against adversaries that exploit the warfighting advantages of Artificial Intelligence on the battlefield, rapidly reprogrammable Electronic Warfare Systems to rapidly and reliably deploy software-based Electronic Warfare applications, Networked, Collaborative, Autonomous Weapons to determine the operational advantages of networks, communication links and autonomy on inventory and future weapon platforms, and a counter-Artificial Intelligence experimentation effort that seeks to inject data and misinformation to outpace our Adversary's Artificial Intelligence by taking advantage of Artificial Intelligence error, biases, and inability to adapt and understand novelty. Smaller experimentation campaigns will also be executed based on warfighting concepts that emerge from Air University Chief of Staff of the Air Force sponsored Blue Horizon's program "How might we further dissolve 'seams' both within the Department of the Air Force and between the Air and Space Forces and their key partners - Joint teammates, allies & partners, Office of the Secretary of Defense, Congress, and industry". All experimentation campaigns have strong stakeholder partnership. These experimentation campaign focus areas align directly with Secretary of the Air Force and National Defense Strategy priorities. Experimentation campaigns will generate information on competitive advantage, total life cycle cost of the acquiring the capability, reliability and maintainability, and product support strategy.</p> <p><i>FY 2022 Plans:</i> Continue experimentation campaigns to advance multi-domain operations and seek competitive advantages against our adversaries, as directed by Department of the Air Force Leadership. In FY 2022 Autonomous, Attritable Aircraft will be flown alongside operational aircraft (F-15, F-16, F-35, etc.) as part of several operational flight tests and AF exercises while the Base Defense Campaign will complete an operational experimentation effort targeting, tracking, engaging, and ultimately killing incoming live cruise missiles with a mix of existing short, medium, and long-range munitions. Software-based Electronic Warfare will be remotely deployed on operational platforms to provide 4th generation fighters the most advanced and unpredictable Electronic Warfare capability denying the adversaries ability to counter our electronic attack. Network, Collaborative, Autonomous Weapons will utilize current weapon systems and test surrogates (to reduce costs) as part of operational exercises to improve lethality and precision while reducing the number of salvos required per target. Counter-Artificial Intelligence experiments will leverage work from the intelligence communities and focus on how adversaries employ artificial intelligence algorithms and specific mechanisms to counter those applications introducing false truths and uncertainties. Additional Experimentation campaigns such as Agile Combat Employment operations that enable forward deployed operations to be quickly and effectively established and an MC-130J Amphibious Capability that will penetrate adversary air defenses and quickly deploy assets will be identified based on outcomes of the warfighting concept analysis. Smaller experimentation campaigns will be let as identified to address the strategic dilemma posed at Air University's Chief of Staff of the Air Force sponsored Blue Horizons program. Only those Experimentation efforts that are deemed the absolute highest priority by the Department of the Air Force Leadership will</p>			

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force	Date: May 2021
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Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0604858F / <i>Tech Transition Program</i>	Project (Number/Name) 645350 / <i>Experimentation</i>
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B. Accomplishments/Planned Programs (\$ in Millions)	FY 2020	FY 2021	FY 2022
<p>be executed aiming to seek technologies and processes that will have the largest competitive advantages and provide the most significant dilemmas against our adversaries will be investigated or executed. Data from all efforts is provided directly to AF Futures, Secretary of the Air Force for Acquisition, Technology and Logistics, and US Space Force Futures and Integration to drive capability development decisions and inform warfighting concepts.</p> <p><i>FY 2021 to FY 2022 Increase/Decrease Statement:</i> FY 2022 funding increased compared to FY 2021 by \$11.111 million. Funding increased due to increased requirements for Base Defense experiment and Network Collaborative Autonomous Weapon experiment.</p>			
Accomplishments/Planned Programs Subtotals	93.124	70.272	81.383

	FY 2020	FY 2021
<p><i>Congressional Add:</i> Program Increase - Low Cost Attritable Aircraft Technology</p> <p><i>FY 2020 Accomplishments:</i> Conduct Congressionally-directed efforts</p> <p><i>FY 2021 Plans:</i> Conduct Congressionally-directed efforts</p>	96.706	50.000
<p><i>Congressional Add:</i> Program increase - small business research for rocket technology</p> <p><i>FY 2020 Accomplishments:</i> N/A</p> <p><i>FY 2021 Plans:</i> Conduct Congressionally-directed efforts (realigned to PE 0602203F, Aerospace Propulsion)</p>	0.000	2.500
<p><i>Congressional Add:</i> Program Increase - Directed Energy Experimentation</p> <p><i>FY 2020 Accomplishments:</i> Conduct Congressionally-directed efforts</p> <p><i>FY 2021 Plans:</i> N/A</p>	4.835	0.000
<p><i>Congressional Add:</i> Program Increase - Autonomous Air Combat Operations</p> <p><i>FY 2020 Accomplishments:</i> N/A</p> <p><i>FY 2021 Plans:</i> Conduct Congressionally-directed efforts</p>	0.000	5.000
<p><i>Congressional Add:</i> Program Increase - Cold Spray and Directed Energy Deposition</p> <p><i>FY 2020 Accomplishments:</i> N/A</p> <p><i>FY 2021 Plans:</i> Conduct Congressionally-directed efforts (realigned to R-56A, PE 0708051F, Rapid Sustainment Modernization)</p>	0.000	6.000
<p><i>Congressional Add:</i> Program Increase - Arctic Communications</p>	0.000	50.000

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force	Date: May 2021
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Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0604858F / <i>Tech Transition Program</i>	Project (Number/Name) 645350 / <i>Experimentation</i>
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	FY 2020	FY 2021
FY 2020 Accomplishments: N/A		
FY 2021 Plans: Conduct Congressionally-directed efforts (executed in project 645351 / Prototyping)		
Congressional Add: Program Increase - Massive Area Additive Manufacturing	0.000	10.000
FY 2020 Accomplishments: N/A		
FY 2021 Plans: Conduct Congressionally-directed efforts (realigned to R-56A, PE 0708051F, Rapid Sustainment Modernization)		
Congressional Add: Program Increase - Additive Manufacturing for Metals	0.000	10.000
FY 2020 Accomplishments: N/A		
FY 2021 Plans: Conduct Congressionally-directed efforts (realigned to R-33, PE 0603680F, Manufacturing Technology Program)		
Congressional Adds Subtotals	101.541	133.500

C. Other Program Funding Summary (\$ in Millions)

N/A

Remarks

D. Acquisition Strategy

Experimentation campaigns will aid the advancement and transition of advanced technologies by providing the credible evidence decision makers need to make sound strategic decisions and investment choices, to provide the warfighter with advanced capabilities. Air Force Futures, Air Force Plans and Programs, US Space Force Futures and Integration, and the Office of the Assistant Secretary of the Air Force for Acquisition, Technology and Logistics direct experimentation campaigns. The Air Force Strategic Development Planning and Experimentation (SDPE) Office located at Wright-Patterson Air Force Base, Ohio and Eglin Air Force Base manages and executes each experimentation campaign. Contracting strategies vary based on the activities of each campaign.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0604858F / Tech Transition Program	Project (Number/Name) 645350 / Experimentation
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Product Development (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Experimentation Campaigns	C/Various	Various : Various	-	6.640	Mar 2020	-		-		-		-	-	-	-
Experimentation Campaign: Hawkeye Contract 1	C/CPFF	L3 : Salt Lake City, UT	-	5.500	Apr 2020	-		-		-		-	-	-	-
Experimentation Campaign: Hawkeye Contract 2	C/CPFF	Lockheed : Fort Worth, TX	-	1.900	Mar 2020	0.700	Feb 2021	-		-		-	-	-	-
Experimentation Campaign: Hawkeye Contract 3	C/CPFF	Northrop Grumman : San Diego, CA	-	1.100	Mar 2020	-		-		-		-	-	-	-
Experimentation Campaign: Directed Energy	C/Various	Various : Various	-	3.500	Apr 2020	-		-		-		-	-	-	-
Experimentation: Campaign: Hawkeye Contract 4	C/CPFF	Space X : Hawthorne, CA	-	4.980	Mar 2020	7.000	Jun 2021	-		-		-	-	-	-
Experimentation Campaign: Advanced Attributable Aircraft	Various	Various : Various	-	4.120	Mar 2020	2.950	Jan 2022	6.000	Jan 2022	-		6.000	-	-	-
Experimentation Campaign Hawkeye Contract 5	C/CPFF	Raytheon : McKinney,, TX	-	-		5.000	Feb 2021	-		-		-	-	-	-
Experimentation Campaign: Hawkeye Contract 5	C/CPFF	Ball Aerospace : Boulder, CO	-	4.500	Aug 2020	-		-		-		-	-	-	-
Experimentation Campaign Hawkeye Contract 6	Various	Various : Various	-	2.250	May 2020	2.000	Jun 2021	-		-		-	-	-	-
Experimentation Campaign Advanced Attributable Aircraft	C/CPFF	Lockheed : Palmdale, CA	-	1.600	Sep 2020	4.100	Mar 2021	-		-		-	-	-	-
Experimentation Campaign Advanced Attributable Aircraft Contract 2	C/CPFF	Kratos : Colorado Springs, CO	-	5.900	Sep 2020	3.200	Feb 2021	-		-		-	-	-	-

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0604858F / Tech Transition Program	Project (Number/Name) 645350 / Experimentation
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Product Development (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Experimentation Campaign Advanced Attritable Aircraft Contract 3	C/CPFF	Calspan : Buffalo, NY	-	-		4.800	Jun 2021	-		-		-	-	-	-
Experimentation Campaigns Blue Horizons	Various	Various : Various	-	-		3.243	Feb 2021	2.750	Jan 2022	-		2.750	-	-	-
Experimentation Campaign Base Defense Contract	C/CPFF	Raytheon : Tucson, AZ	-	1.900	May 2020	3.000	May 2021	-		-		-	-	-	-
Experimentation Campaign Base Defense Contract 2	C/CPFF	BAE : TBD	-	2.300	Oct 2020	2.200	Jul 2021	-		-		-	-	-	-
Experimentation Campaign PNT	C/CPFF	Various : Various	-	0.560	May 2020	0.630	Apr 2021	-		-		-	-	-	-
Experimentation Campaign Palletized Munitions (contract 2)	C/CPFF	Various : Various	-	0.120	Mar 2020	-		-		-		-	-	-	-
Experimentation Campaign Palletized Munitions	C/CPFF	Lockheed Martin : Orlando, FL	-	4.400	Jul 2020	-		-		-		-	-	-	-
Experimentation Campaign Base Defense Contract TBD	TBD	TBD : TBD	-	-		-		10.000	Jan 2022	-		10.000	-	-	-
Experimentation Campaign AERRES	TBD	Various : Various	-	3.240	Aug 2020	3.490	Mar 2021	4.000	Jan 2022	-		4.000	-	-	-
Experimentation Campaign Counter AI	TBD	TBD : TBD	-	-		-		3.000	Dec 2021	-		3.000	-	-	-
Experimentation Campaign Agile Combat Employment Pathfinders	TBD	TBD : TBD	-	-		-		2.000	Jan 2022	-		2.000	-	-	-
Experimentation Campaign MC130J Amphibious Capability	TBD	TBD : TBD	-	-		-		2.000	Feb 2022	-		2.000	-	-	-
Congressional Add - Directed Energy Experimentation	Various	Various : Various	-	4.800	Apr 2020	-		-		-		-	-	-	-

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0604858F / <i>Tech Transition Program</i>	Project (Number/Name) 645350 / <i>Experimentation</i>
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Product Development (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Congressional Add - Low Cost Attributable Aircraft Technology	C/Various	Various : Various	-	96.706	Jul 2020	50.000	Aug 2021	-		-		-	-	-	-
Congressional Add - Autonomous Air Combat Operations	Various	Various : Various	-	-		5.000	Jun 2021	-		-		-	-	-	-
Congressional Add - Arctic Communications (executed in project 645351 / Prototyping)	Various	Various : Various	-	-		50.000	Apr 2021	-		-		-	-	-	-
Congressional Add - Small Business Research for Rocket Technology (executed in PE 0602203F/Aerospace Propulsion)	Various	Various : Various	-	-		2.500	Sep 2021	-		-		-	-	-	-
Congressional Add - Cold Spray and Directed Energy Deposition (executed in PE 0708051F, Rapid Sustainment Modernization)	Various	Various : Various	-	-		6.000	Jul 2021	-		-		-	-	-	-
Congressional Add - Massive Area Additive Manufacturing (executed in PE 0603680F, Manufacturing Technology Program)	Various	Various : Various	-	-		10.000	Aug 2021	-		-		-	-	-	-
Congressional Add - Additive Manufacturing for Metals (executed in PE 0708051F, Rapid Sustainment Modernization)	Various	Various : Various	-	-		10.000	Aug 2021	-		-		-	-	-	-
Commercial Space Internet Prototyping:	C/CPAF	Space X : Hawthorne	-	9.000	Mar 2020	7.400	Mar 2021	-		-		-	-	-	-

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0604858F / Tech Transition Program	Project (Number/Name) 645350 / Experimentation
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Product Development (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract	
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost				
Global Lightning Contract 2																
Commercial Space Internet Prototyping: Global Lightning Contract 4	C/CPAF	Northrop Grumman : San Diego, CA	-	5.424	Mar 2020	-		-		-		-	-	-	-	-
Subtotal			-	170.440		183.213		29.750		-		29.750	-	-	-	N/A

Remarks
Experimentation is focused on rapid learning and then pivoting based on that learning. Therefore, specific plans are not detailed to prevent locking into an approach that will likely shift based on current experimentation efforts. Further budget details can be provided in the appropriate forum.

Support (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract	
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost				
Experimentation Campaign Support	Various	Various : Various	-	1.110	Jan 2020	0.731	Mar 2021	2.000	Mar 2022	-		2.000	-	-	-	
Experimentation Campaign: Directed Energy Modeling and Simulation Support, Data Analysis and Vignette Support	MIPR	AFRL : WPAFB, OH	-	2.500	Jan 2020	-		-		-		-	-	-	-	
Experimentation Campaign Advanced Atritable Aircraft	MIPR	Perduco/GSA : O'Fallon, IL	-	1.000	Feb 2020	2.100	May 2021	6.000	Nov 2021	-		6.000	-	-	-	
Experimentation Campaign PNT	MIPR	DTIC : Ft Belvoir, VA	-	1.200	Jul 2020	-		-		-		-	-	-	-	
Experimentation Campaign Base Defense	MIPR	Various : Various	-	3.850	May 2020	-		5.000	Nov 2021	-		5.000	-	-	-	
Experimentation Campaign NCA Weapons	Various	Various : TBD	-	-		-		1.000	Feb 2022	-		1.000	-	-	-	
Subtotal			-	9.660		2.831		14.000		-		14.000	-	-	-	N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0604858F / Tech Transition Program	Project (Number/Name) 645350 / Experimentation
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Test and Evaluation (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Experimentation Campaign Test and Evaluation	MIPR	Various : Various	-	1.527	Feb 2020	2.350	Mar 2021	0.750	Dec 2021	-		0.750	-	-	-
Directed Energy Experimentation Campaign	MIPR	96thTW : Eglin, NM	-	4.520	Sep 2020	-		-		-		-	-	-	-
Experimentation Campaign Hawkeye	Various	Various : Various	-	1.500	Aug 2020	1.500	May 2021	-		-		-	-	-	-
Experimentation Campaign Advanced Attributable Aircraft	MIPR	Various : Eglin AFB, FL	-	0.750	Mar 2020	1.150	Jun 2021	12.000	Apr 2022	-		12.000	-	-	-
Experimentation Campaign AERRES	MIPR	Various : Various	-	-		1.970	Jun 2021	1.000	Dec 2021	-		1.000	-	-	-
Experimentation Campaign Base Defense	MIPR	Various : Various	-	1.600	Apr 2020	3.569	Mar 2021	12.000	Dec 2021	-		12.000	-	-	-
Experimentation Campaign Palletized Munitions	MIPR	96TW : Eglin AFB, FL	-	0.940	Feb 2020	-		-		-		-	-	-	-
Experimentation Campaign Agile Combat Employment Pathfinders	TBD	TBD : TBD	-	-		-		1.000	Feb 2022	-		1.000	-	-	-
Experimentation Campaign NCA Weapons	TBD	TBD : TBD	-	-		-		5.000	Jan 2022	-		5.000	-	-	-
Experimentation Campaign Counter AI	Various	Various : Various	-	-		-		1.000		-		1.000	-	-	-
Subtotal			-	10.837		10.539		32.750		-		32.750	-	-	N/A

Management Services (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Experimentation Campaign Contractor Support	Various	Various : Various	-	1.190	Mar 2020	0.197	Mar 2021	0.143	Dec 2021	-		0.143	-	-	-
Experimentation Campaign Program Management Administration Costs	Various	Various : Various	-	2.538	Aug 2020	6.992	Feb 2021	4.740	Jan 2022	-		4.740	-	-	-

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Exhibit R-4, RDT&E Schedule Profile: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0604858F / Tech Transition Program	Project (Number/Name) 645350 / Experimentation
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FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

Experimentation	
Experimentation Campaigns	
Directed Energy Weapons Experimentation Campaign	
Directed Energy Experimentation	
Commercial Space Internet	
Commercial Space Internet Experimentation	
Palletized Munitions	
Palletized Munitions	
App Enabled Rapidly Reprogrammable EW/ EMS Systems (AERRES)	
App Enabled Rapidly Reprogrammable EW/ EMS Systems (AERRES)	
Hawkeye	
Hawkeye Experimentation	
Congressional Add Directed Energy	
Directed Energy Congressional Add	
Congressional Add - Cold Spray and Directed Energy Deposition	
Congressional Add - Cold Spray and Directed Energy Deposition	
Congressional Add - Autonomous Air Combat Operations	
Congressional Add - Autonomous Air Combat Operations	
Congressional Add Low Cost Attributable Aircraft Technology	

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Exhibit R-4, RDT&E Schedule Profile: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0604858F / Tech Transition Program	Project (Number/Name) 645350 / Experimentation
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	FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Low Cost Attributable Aircraft Technology Congressional Add	[REDACTED]																											
<i>Congressional Add small business research for rocket technology</i>																												
Congressional Add small business research for rocket technology	[REDACTED]																											
<i>Base Defense Experiment</i>																												
Base Defense Experiment	[REDACTED]																											
<i>Autonomous Attributable Aircraft Experiment (AAAx)</i>																												
Autonomous Attributable Aircraft Experiment (AAAx)	[REDACTED]																											
<i>Pathfinders</i>																												
Pathfinders	[REDACTED]																											
<i>PNT Experimentation Pipeline</i>																												
PNT Experimentation Pipeline	[REDACTED]																											
<i>Rapid Prototyping Testings</i>																												
Rapid Prototyping Testing	[REDACTED]																											
<i>Blue Horizons Projects</i>																												
Blue Horizons Projects	[REDACTED]																											
<i>Counter AI</i>																												
Counter AI Experimentation	[REDACTED]																											
<i>Network, Collaborative, Autonomous Weapon Experiment</i>																												
Network, Collaborative, Autonomous Weapon Experiment	[REDACTED]																											
<i>MC-130 Amphibious Capability Experimentation</i>																												

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Exhibit R-4, RDT&E Schedule Profile: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0604858F / <i>Tech Transition Program</i>	Project (Number/Name) 645350 / <i>Experimentation</i>
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	FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
MC-130 Amphibious Capability Experimentation	[REDACTED]																											

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Exhibit R-4A, RDT&E Schedule Details: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0604858F / <i>Tech Transition Program</i>	Project (Number/Name) 645350 / <i>Experimentation</i>
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Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>Experimentation</i>				
Experimentation Campaigns	1	2020	4	2026
<i>Directed Energy Weapons Experimentation Campaign</i>				
Directed Energy Experimentation	1	2020	4	2020
<i>Commercial Space Internet</i>				
Commercial Space Internet Experimentation	1	2020	4	2020
<i>Palletized Munitions</i>				
Palletized Munitions	1	2020	4	2020
<i>App Enabled Rapidly Reprogrammable EW/EMS Systems (AERRES)</i>				
App Enabled Rapidly Reprogrammable EW/EMS Systems (AERRES)	1	2020	4	2023
<i>Hawkeye</i>				
Hawkeye Experimentation	1	2020	4	2023
<i>Congressional Add Directed Energy</i>				
Directed Energy Congressional Add	1	2020	4	2020
<i>Congressional Add - Cold Spray and Directed Energy Deposition</i>				
Congressional Add - Cold Spray and Directed Energy Deposition	1	2021	4	2021
<i>Congressional Add - Autonomous Air Combat Operations</i>				
Congressional Add - Autonomous Air Combat Operations	1	2021	4	2021
<i>Congressional Add Low Cost Attritable Aircraft Technology</i>				
Low Cost Attritable Aircraft Technology Congressional Add	1	2020	4	2021
<i>Congressional Add small business research for rocket technology</i>				
Congressional Add small business research for rocket technology	1	2021	4	2021
<i>Base Defense Experiment</i>				

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Exhibit R-4A, RDT&E Schedule Details: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0604858F / <i>Tech Transition Program</i>	Project (Number/Name) 645350 / <i>Experimentation</i>
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Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
Base Defense Experiment	1	2020	4	2023
<i>Autonomous Attributable Aircraft Experiment (AAAx)</i>				
Autonomous Attributable Aircraft Experiment (AAAx)	1	2020	4	2023
<i>Pathfinders</i>				
Pathfinders	1	2020	4	2026
<i>PNT Experimentation Pipeline</i>				
PNT Experimentation Pipeline	1	2020	4	2023
<i>Rapid Prototyping Testings</i>				
Rapid Prototyping Testing	1	2020	4	2026
<i>Blue Horizons Projects</i>				
Blue Horizons Projects	1	2021	4	2026
<i>Counter AI</i>				
Counter AI Experimentation	1	2022	4	2025
<i>Network, Collaborative, Autonomous Weapon Experiment</i>				
Network, Collaborative, Autonomous Weapon Experiment	1	2022	4	2025
<i>MC-130 Amphibious Capability Experimentation</i>				
MC-130 Amphibious Capability Experimentation	1	2022	4	2024

Note

Experimentation is focused on rapid learning and then pivoting based on that learning. They are used to determine the competitive advantage a technology or warfighting concept can have over our adversaries and ascertain operational utility. Often Experimentation Campaigns uncover new ways to use existing technology or how to exploit new Science and Technology for our competitive gain. Further schedule details regarding individual experimentation campaigns can be provided in the appropriate forum.

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force										Date: May 2021		
Appropriation/Budget Activity 3600 / 4					R-1 Program Element (Number/Name) PE 0604858F / Tech Transition Program				Project (Number/Name) 645351 / Prototyping			
COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
645351: Prototyping	-	128.128	102.171	204.695	0.000	204.695	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Prototyping project enables integration and demonstration of emerging technologies in an operational environment in order to determine and evaluate the complete advantage against our adversaries and how the technology is integrated into the future fight. Prototype project investments focus on three major thrusts (1) advancing capabilities of legacy weapon systems, (2) militarizing novel mature commercial technologies, and (3) exploring partnerships with Department of the Air Force Program Executive Officers to rapidly transition technologies that are being developed as part of the Department of Air Force Vanguard programs. Prototype project investments funded under the advancing capabilities of legacy weapon systems thrust focus on integrating commercial proliferated Low Earth Orbit satellite capabilities into legacy weapon systems, directed energy and kinetic energy effectors for base defense, multi-source resilient Position Navigation and Timing pod, and software defined electronic warfare and communication capabilities. Prototype projects under the militarizing novel mature commercial technologies thrust will focus on artificial intelligence, autonomy, cyber warfare capabilities, digital engineering and novel weapon and aircraft technologies. Finally, prototype projects under the exploring partnerships thrust will invest in risk reduction activities in partnership with the Department of the Air Force Program Executive Officers assigned to each of the Department of the Air Force Vanguard Programs to ensure rapid and seamless transition of Science and Technology into warfighting capabilities.

This program element may include necessary emergent or unanticipated civilian pay expenses required to manage, execute, and deliver Tech Transition - Prototyping for emergent or unanticipated weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program element 0605831F.

B. Accomplishments/Planned Programs (\$ in Millions)

	FY 2020	FY 2021	FY 2022
Title: Lifecycle Prototyping	56.621	78.421	204.695
<p>Description: Following the direction described in the National Defense Strategy the Strategic Development Planning and Experimentation Office (SDPE) leads cross-functional teams composed of operators, technologists, engineers, acquisition, and requirements personnel from across the Department of the Air Force to execute Campaigns that consist of war-winning Prototypes to determine if and how much of a competitive advantage can be leveraged against our adversaries. Developmental Prototypes are an opportunity to understand the operational utility of a new warfighting concept or technology, while avoiding the pitfalls of entering into a lengthy, formal acquisition program without the requisite knowledge of performance trade-offs and technical and programmatic risks. Prototypes integrated into carefully crafted operational Campaigns provide immediate feedback to Department of the Air Force senior leaders driving rapid acquisition or divestment with very minimal resources. Prototype efforts provide an initial capability if warranted that can act as a catalyst for future rapid acquisition. Exploring innovative prototypes that range across the full Doctrine, Organization, Training, Materiel, Leadership and Education, Personnel, Facilities and Policy</p>			

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force	Date: May 2021
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Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0604858F / <i>Tech Transition Program</i>	Project (Number/Name) 645351 / <i>Prototyping</i>
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B. Accomplishments/Planned Programs (\$ in Millions)	FY 2020	FY 2021	FY 2022
FY 2022 funding increased compared to FY 2021 by \$126.274 million. Funding increased due to increased requirements for system prototyping including Base Defense, Palletized Munitions, Operational Energy efforts, Regional Operating Picture, and Watchtower Initiatives.			
Accomplishments/Planned Programs Subtotals	56.621	78.421	204.695

	FY 2020	FY 2021
Congressional Add: Program Increase - Rapid Sustainment Office <i>FY 2020 Accomplishments:</i> Conduct Congressionally-directed efforts <i>FY 2021 Plans:</i> N/A	19.341	0.000
Congressional Add: Program Increase - Reliable Power for Critical Infrastructure <i>FY 2020 Accomplishments:</i> Conduct Congressionally-directed efforts <i>FY 2021 Plans:</i> N/A	5.802	0.000
Congressional Add: Program Increase - Agility Prime <i>FY 2020 Accomplishments:</i> Conduct Congressional - directed efforts <i>FY 2021 Plans:</i> n/a	24.122	0.000
Congressional Add: Program Increase - Logistics Technologies <i>FY 2020 Accomplishments:</i> Conduct Congressionally-directed efforts <i>FY 2021 Plans:</i> Conduct Congressionally-directed efforts	4.835	8.750
Congressional Add: Program Increase - Small Satellite Manufacturing <i>FY 2020 Accomplishments:</i> Conduct Congressionally-directed efforts <i>FY 2021 Plans:</i> N/A	7.736	0.000
Congressional Add: Program Increase - Additive Manufacturing <i>FY 2020 Accomplishments:</i> Conduct Congressionally-directed efforts <i>FY 2021 Plans:</i> N/A	9.671	0.000
Congressional Add: Program Increase - Heavy Payload Solar Powered UAS JCTC	0.000	15.000

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force	Date: May 2021
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Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0604858F / <i>Tech Transition Program</i>	Project (Number/Name) 645351 / <i>Prototyping</i>
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	FY 2020	FY 2021
FY 2020 Accomplishments: n/a		
FY 2021 Plans: Conduct Congressionally-directed efforts		
Congressional Adds Subtotals	71.507	23.750

C. Other Program Funding Summary (\$ in Millions)

N/A

Remarks

D. Acquisition Strategy

For Spectral Halo, the Air Force awarded to existing cost plus type contracts with Herrick Technology Laboratories, Inc (MD), Northeast Information Discovery, Inc (NY), Advanced Geolocation Solutions, Inc (VA), and MITRE (MA).

For Low Cost Attributable Aircraft Technology, the Air Force leveraged the Defense Innovation Unit Experimental Other Transaction Authority to award a Firm Fixed Price Contract to the following contractors: Lockheed Martin, Aurora, Autonodyne, Venator, and Fregata.

Acquisition strategies for other prototypes from Congressional adds and OCO funding vary based on the activities of each prototype.

Miscellaneous emerging prototyping will be based on guidance from Department leadership.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0604858F / <i>Tech Transition Program</i>	Project (Number/Name) 645351 / <i>Prototyping</i>
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Product Development (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Spectral Halo Pod: Rapid Prototype of Aircraft Stores	C/CPFF	Various : Various	-	12.170	Mar 2020	-		-		-		-	-	-	-
Spectral Halo Pod: Rapid Prototyping of UAV Payloads	C/CPFF	Various : Various	-	3.880	Oct 2019	-		-		-		-	-	-	-
Vanguard Prototyping	Various	Various : Various	-	-		1.860	Mar 2021	-		-		-	-	-	-
Commercial Space Internet Prototyping - Global Lightning Contract 1	C/CPFF	Raytheon : McKnney, TX	-	-		8.000	Mar 2021	-		-		-	-	-	-
Commercial Space Internet Prototyping: Global Lightning Contract 3	C/CPFF	Various : Various	-	-		4.090	Mar 2021	20.000	Nov 2021	-		20.000	-	-	-
Commercial Space Internet Prototyping: Global Lightning Contract 4	C/CPAF	Northrop Grumman : San Diego, CA	-	-		5.500	Apr 2021	-		-		-	-	-	-
Commercial Space Internet Prototyping: Global Lightning Contract 5	C/CPFF	L3 : Salt Lake City, UT	-	2.172	Jul 2020	4.000	Apr 2021	-		-		-	-	-	-
Commercial Space Internet Prototyping - Global Lightning Contract 6	C/CPFF	Ball Aerospace : Boulder, CO	-	-		5.300	Mar 2021	-		-		-	-	-	-
Prototyping Base Defense Contract 1	C/CPFF	BAE : Minneapolis, MN	-	-		10.600	May 2021	-		-		-	-	-	-
Hawkeye	C/CPFF	Various : Various	-	-		-		10.000	Nov 2021	-		10.000	-	-	-
Prototyping Base Defense	Various	Various : Various	-	-		6.000	Mar 2021	9.000	Dec 2021	-		9.000	-	-	-
Prototyping Palletized Munitions (Rapid Dragon)	C/CPFF	Lockheed Martin : Orlando, FL	-	-		15.000	May 2021	-		-		-	-	-	-
Prototyping Palletized Munitions (Rapid Dragon) Contract 2	C/Various	Various : Various	-	-		5.300	Mar 2021	9.695	Nov 2021	-		9.695	-	-	-

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0604858F / <i>Tech Transition Program</i>	Project (Number/Name) 645351 / <i>Prototyping</i>
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Product Development (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
ROP Watchtower	Various	Various : Various	-	-		-		18.000	Jan 2022	-		18.000	-	-	-
MC-130J Amphibious Capability	Various	Various : Various	-	-		-		2.000	Mar 2022	-		2.000	-	-	-
C-17 Microvanes	Various	Various : Various	-	-		-		3.000	Dec 2021	-		3.000	-	-	-
KC-135 Vertical Wipers	Various	Various : Various	-	-		-		2.000	Dec 2021	-		2.000	-	-	-
KC-135 Drag Reduction	Various	Various : Various	-	-		-		4.000	Dec 2021	-		4.000	-	-	-
Mobility Air Forces Allocation/Long Range Planning	Various	Various : Various	-	-		-		6.000	Dec 2021	-		6.000	-	-	-
Puckboard Scheduling Engine	Various	Various : Various	-	-		-		6.000	Dec 2021	-		6.000	-	-	-
Cargo Optimization - Improved Load Planning	Various	Various : Various	-	-		-		6.000	Dec 2021	-		6.000	-	-	-
Mobility Air Forces Flight Control Surface Rigging	Various	Various : Various	-	-		-		2.000	Dec 2021	-		2.000	-	-	-
C-130 Finlets	Various	Various : Various	-	-		-		3.000	Dec 2021	-		3.000	-	-	-
C-17 Engine Pylon Fairings	Various	Various : Various	-	-		-		1.500	Dec 2021	-		1.500	-	-	-
Podded Position Navigation and Timing Prototyping	Various	Various : Various	-	-		-		5.000	Dec 2021	-		5.000	-	-	-
Navigation Technology Satellite - 3, Prototyping	Various	Various : Various	-	-		-		5.000	Dec 2021	-		5.000	-	-	-
Congressional Add Rapid Sustainment Office	Various	Various : Various	-	19.341	Oct 2020	-		-		-		-	-	-	-
Congressional Add Reliable Power for Critical Infrastructure	Various	Various : Various	-	5.802	Nov 2020	-		-		-		-	-	-	-
Congressional Add Logistics Technologies	Various	Various : Various	-	4.835	Dec 2020	8.750	Dec 2021	-		-		-	-	-	-
Congressional Add Small Satellite Manufacturing	Various	Various : Various	-	7.736	Dec 2020	-		-		-		-	-	-	-

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0604858F / <i>Tech Transition Program</i>	Project (Number/Name) 645351 / <i>Prototyping</i>
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Product Development (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Congressional Add Additive Manufacturing	Various	Various : Various	-	9.671	Sep 2020	-		-		-		-	-	-	-
Congressional Add Heavy Payload Solar Powered UAS JCTD	Various	Various : Various	-	-		15.000	Aug 2021	-		-		-	-	-	-
Congressional Add Agility Prime	Various	Various : Various	-	24.122	Jan 2021	-		-		-		-	-	-	-
Mobile Counter-UAS Airborne Payload Suite OCO	C/TBD	TBD : TBD	-	7.488	Jun 2020	-		-		-		-	-	-	-
Integrated Expeditionary Counter-Unmanned Aerial System OCO	C/TBD	TBD : TBD	-	1.966	Jun 2020	-		-		-		-	-	-	-
Persistent Overhead Surveillance/ Reconnaissance for Special Operations OCO	C/TBD	TBD : TBD	-	9.929	Jun 2020	-		-		-		-	-	-	-
Overhead Surveillance/ Reconnaissance for Special Operations OCO	C/TBD	TBD : TBD	-	5.395	Jun 2020	-		-		-		-	-	-	-
Instant Fuel Leak Repair OCO	C/CPFF	University of Dayton : Dayton	-	0.723	Apr 2020	-		-		-		-	-	-	-
Subtotal			-	115.230		89.400		112.195		-		112.195	-	-	N/A

Support (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Spectral Halo Pod: Rapid Prototyping of Aircraft Stores Support	MIPR	AFRL : Bedford, MA	-	1.155	Feb 2020	-		-		-		-	-	-	-
Spectral Halo Pod: Rapid Prototyping of UAV Payloads Support	C/Various	AFRL : Rome, NY	-	2.409	Feb 2020	-		-		-		-	-	-	-

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0604858F / Tech Transition Program	Project (Number/Name) 645351 / Prototyping
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Support (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Global Lightning/ Commercial Space Support	MIPR	RAND : Santa Monica, CA	-	0.674	Feb 2020	-		3.000	Dec 2021	-		3.000	-	-	-
Prototyping Campaign FloatPlane MC130J Amphibious Capability	MIPR	WHS : Washington, DC	-	-		3.500	May 2021	-		-		-	-	-	-
Hawkeye	Various	Various : Various	-	-		-		4.000	Dec 2021	-		4.000	-	-	-
Base Defense Support	Various	Various : Various	-	-		-		5.000	Nov 2021	-		5.000	-	-	-
Rapid Dragon (Palletized Munitions)	Various	Various : Various	-	-		0.250	Mar 2021	4.000	Nov 2021	-		4.000	-	-	-
Autonomous Attritable Aircraft	Various	Various : Various	-	-		-		2.000	Feb 2022	-		2.000	-	-	-
Network, Collaborative, Autonomous Weapons	Various	Various : Various	-	-		-		1.000	Feb 2022	-		1.000	-	-	-
MC-130J Amphibious Capability	Various	Various : Various	-	-		-		1.000	Dec 2021	-		1.000	-	-	-
ROP Watchtower	Various	Various : Various	-	-		-		2.000	Apr 2022	-		2.000	-	-	-
Podded Position Navigation and Timing Prototyping	Various	Various : Various	-	-		-		1.000	Dec 2021	-		1.000	-	-	-
Subtotal			-	4.238		3.750		23.000		-		23.000	-	-	N/A

Test and Evaluation (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Spectral Halo Pod: Rapid Prototyping of Aircraft Stores Support	MIPR	AFRL : Patuxent River, MD	-	0.192	Feb 2020	-		-		-		-	-	-	-
Spectral Halo Pod: Rapid Prototyping of UAF Payloads Support	Various	Various : Various	-	4.817	Mar 2020	-		-		-		-	-	-	-

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0604858F / Tech Transition Program	Project (Number/Name) 645351 / Prototyping
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Test and Evaluation (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Global Lightning/ Commercial Space Internet	MIPR	Various : Various	-	1.876	Mar 2020	1.750	Apr 2021	5.000	Dec 2021	-		5.000	-	-	-
Rapid Dragon (Palletized Munitions)	MIPR	Various : Various	-	-		1.440	May 2021	10.000	Dec 2021	-		10.000	-	-	-
Vanguard Test and Evaluation	MIPR	Various : Various	-	-		2.190	Apr 2021	13.000	Feb 2022	-		13.000	-	-	-
Hawkeye Test and Evaluation	MIPR	Various : Various	-	-		-		9.000	Dec 2021	-		9.000	-	-	-
Base Defense Test and Evaluation	MIPR	Various : Various	-	-		-		8.000	Nov 2021	-		8.000	-	-	-
Network, Collaborative, Autonomous Weapons	MIPR	Various : Various	-	-		-		7.000	Apr 2022	-		7.000	-	-	-
MC-130J Amphibious Capability	MIPR	Various : Various	-	-		-		5.000	Mar 2022	-		5.000	-	-	-
ROP Watchtower	MIPR	Various : Various	-	-		-		2.000	May 2022	-		2.000	-	-	-
Podded Position Navigation and Timing Prototyping	Various	Various : Various	-	-		-		4.000	Dec 2021	-		4.000	-	-	-
Subtotal			-	6.885		5.380		63.000		-		63.000	-	-	N/A

Management Services (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Spectral Halo Pod: Rapid Prototyping of Aircraft Stores Support	MIPR	AFRL : Arlington, VA	-	0.096	Oct 2019	-		-		-		-	-	-	-
Spectral Halo Pod: Rapid Prototyping of UAV Payloads Support	MIPR	AFRL : Arlington, VA	-	0.196	Feb 2020	-		-		-		-	-	-	-
Prototyping Contractor Support	Various	Various : Various	-	-		0.088	Feb 2021	0.500	Mar 2022	-		0.500	-	-	-

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0604858F / <i>Tech Transition Program</i>	Project (Number/Name) 645351 / <i>Prototyping</i>
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Management Services (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Prototyping Program Management Administration Costs	Various	Various : Various	-	1.483		3.553	Feb 2021	6.000	Feb 2022	-		6.000	-	-	-
Subtotal			-	1.775		3.641		6.500		-		6.500	-	-	N/A
Project Cost Totals			-	128.128		102.171		204.695		-		204.695	-	-	N/A

Remarks
 Additional details, including Spectral Halo, low-cost attributable aircraft technology, space internet prototyping, and other emerging prototyping efforts, can be provided in the appropriate forum.

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Exhibit R-4, RDT&E Schedule Profile: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0604858F / Tech Transition Program	Project (Number/Name) 645351 / Prototyping
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	FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
<i>Lifecycle Prototyping</i>																												
Spectral Halo Pod																												
Commercial Space Internet (Global Lightning)																												
Base Defense - Hyper Velocity Gun Weapons System Prototype																												
Palletized Munitions (Rapid Dragon)																												
Regional Ops Picture and Watchtower Initiative																												
Autonomous Attributable Aircraft Prototyping																												
Hawkeye Prototyping																												
Network Collaborative Autonomous Weapon Prototyping																												
MC-130 Amphibious Capability Prototyping																												
Operational Energy efforts																												
OCO - Mobile Counter-UAS Airborne Payload Suite																												
OCO - Integrated Expeditionary Counter Unmanned Aerial Systems																												
OCO - Persistent Overhead Surveillance/ Reconnaissance for Special Operations																												
OCO - Overhead Surveillance/ Reconnaissance for Special Operations																												
OCO - Instant Curing Fuel Leak Repair Technology																												
Congressional Add - Rapid Sustainment Office																												
Congressional Add - Reliable Power for Critical Infrastructure																												

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Exhibit R-4A, RDT&E Schedule Details: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0604858F / <i>Tech Transition Program</i>	Project (Number/Name) 645351 / <i>Prototyping</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>Lifecycle Prototyping</i>				
Spectral Halo Pod	1	2020	4	2020
Commercial Space Internet (Global Lightning)	1	2020	4	2022
Base Defense - Hyper Velocity Gun Weapons System Prototype	1	2021	4	2022
Palletized Munitions (Rapid Dragon)	1	2021	4	2023
Regional Ops Picture and Watchtower Initiative	1	2022	4	2023
Autonomous Attritable Aircraft Prototyping	1	2022	4	2023
Hawkeye Prototyping	1	2022	4	2023
Network Collaborative Autonomous Weapon Prototyping	1	2022	4	2023
MC-130 Amphibious Capability Prototyping	1	2022	4	2023
Operational Energy efforts	1	2022	4	2023
OCO - Mobile Counter-UAS Airborne Payload Suite	1	2020	4	2020
OCO - Integrated Expeditionary Counter Unmanned Aerial Systems	1	2020	4	2020
OCO - Persistent Overhead Surveillance/Reconnaissance for Special Operations	1	2020	4	2020
OCO - Overhead Surveillance/Reconnaissance for Special Operations	1	2020	4	2020
OCO - Instant Curing Fuel Leak Repair Technology	1	2020	4	2020
Congressional Add - Rapid Sustainment Office	1	2020	4	2020
Congressional Add - Reliable Power for Critical Infrastructure	1	2020	4	2020
Congressional Add - Logistics Technologies	1	2020	4	2021
Congressional Add - Small Satellite Manufacturing	1	2020	4	2020
Congressional Add - Advanced Repair and Qualification Processes	1	2020	4	2020
Congressional Add - Additive Manufacturing	1	2020	4	2020
Congressional Add - Heavy Payload Solar Powered UAS JCTD	1	2021	4	2021

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Exhibit R-4A, RDT&E Schedule Details: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0604858F / <i>Tech Transition Program</i>	Project (Number/Name) 645351 / <i>Prototyping</i>
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Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
Congressional Add - Arctic Communications	1	2021	4	2021
Congressional Add - Agility Prime (realigned from PE 0603211F)	1	2021	4	2021
Congressional Add - Solar Block Research (requested realignment from PE 0601103F)	1	2021	4	2021

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 0605230F / <i>Ground Based Strategic Deterrent</i>
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COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
Total Program Element	875.413	538.643	1,447.113	2,553.541	0.000	2,553.541	-	-	-	-	-	-
641025: <i>GROUND BASED STRATEGIC DETERRENT (GBSD)</i>	875.413	538.643	1,447.113	2,553.541	0.000	2,553.541	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-	-	-

Program MDAP/MAIS Code: 493

A. Mission Description and Budget Item Justification

The Ground Based Strategic Deterrent (GBSD) program will design, develop, produce and deploy a replacement for the current Minuteman III (MM III) Intercontinental Ballistic Missile (ICBM) weapon system in order to maintain a safe, secure, reliable, and effective nuclear deterrent. The GBSD program will deliver a fully integrated weapon system beginning in Fiscal Year 2029 to lower lifecycle costs and to close key capability gaps and vulnerabilities identified in the GBSD Capabilities Based Assessment, GBSD Capabilities Development Document, and the GBSD Analysis of Alternatives. GBSD will also mitigate ground-based deterrent degradation due to MM III component age-out and attrition.

The GBSD program will include prime contractor development of applicable support equipment, data, flight test hardware and infrastructure, and training systems while examining and mitigating risk during the MM III to GBSD transition. GBSD program office has partnered with MM III program office to facilitate communication and integration of the weapon system recapitalization during the MM III to GBSD transition. This program includes any needed nuclear surety and certification and system vulnerability assessments.

During the Engineering and Manufacturing Development phase, the GBSD program will execute 1) government system engineering, analytics, and test capability development; 2) air vehicle equipment development; 3) command & launch systems development; 4) launch systems development; 5) support systems development; and 6) weapon system integration.

Government systems engineering investments include development of model-based systems engineering (MBSE), integration, test software, product life-cycle management framework, and modernization of existing system engineering labs and infrastructure. Air vehicle equipment is an integrated missile stack which includes the propulsion, post-boost, guidance, and re-entry systems sub-components. Command & launch encompasses all command and control components and interfaces, associated ground hardware, ground control equipment and associated software directly related to the survivability, monitoring, and launch of the replacement flight system. Launch systems include launch centers, launch facilities, and structures and associated ground mechanical systems. Support systems include operator and maintenance training systems hardware and software, security system architecture, transport support equipment, program office and weapon system facilities, and peculiar/common support equipment. Weapon system integration risk reduction includes non-proprietary open systems architecture with well-defined interfaces and a modular design at the weapon system level to allow future modification and technology insertion. As GBSD progresses toward Critical Design Review (CDR), the GBSD

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force	Date: May 2021
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Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 0605230F / <i>Ground Based Strategic Deterrent</i>
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weapon system design will dictate the parameters for the MILCON real property requirements and their integration with the weapon system component requirements as these are inextricably linked.

The significant increase in funding required for FY22 is to execute the Engineering & Manufacturing Development (EMD) Contract to advance GBSD major activities to include systems engineering activities, information technology, data management, analytical capabilities and deliver a flexible, integrated weapon system critical design. The program will modify, modernize, and expand the analytic environment and labs to support EMD activities to enable full execution of the program's capability to own the technical baseline throughout the program life cycle. This involves establishing a digital engineering system including a supporting environment / infrastructure to perform digital activities, collaborate with, and communicate across stakeholders. Based on success during the Technology Maturation & Risk Reduction contract, this program will continue to examine and mature air vehicle equipment, command and launch, cybersecurity, operator and maintenance training systems hardware and software, security system architecture, transport sub-systems, Peculiar/Common Support Equipment and associated ground technologies. The program will also continue to mature and refine weapon system and non-operational software, software integration and development, modular system architecture requirements, and product life-cycle management. This will continue to require execution and improvement to the unified certification strategy which meets nuclear surety, cyber security, and nuclear safety requirements. The program will also expand and mature the analytical, information technology, test, and data management capabilities to ensure access to weapon system design information is properly controlled and securely transmitted between government and contractors. The program will continue to develop Vandenberg AFB test capabilities and ensure Western Range Test capabilities for the Flight Test Program. Additionally, the GBSD program funds all required developmental and operational test and evaluation activities to meet initial and full operational capability milestones including, but not limited to, developing, improving and modernizing test capabilities essential to reaching those milestones when existing test capabilities are inadequate or non-existent. The program will also continue integrating requirement for dual-capable, air based, survivable launch capability. Finally, the program will establish a government-owned and government-operated DevSecOps/software stack.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver weapon system capability. The use of such programs funds would be in addition to the civilian pay expenses budgeted in program elements 0605833F or 0605831F. In FY2020 14.416M and in FY2021 25.469M was expended for civilian pay expenses in this program element.

This effort is in Budget Activity 4, Advanced Component Development and Prototypes (ACD&P), because efforts are necessary to evaluate integrated technologies, representative modes or prototype systems in a high fidelity and realistic operating environment.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 0605230F / <i>Ground Based Strategic Deterrent</i>
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B. Program Change Summary (\$ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Previous President's Budget	557.495	1,524.759	2,536.450	0.000	2,536.450
Current President's Budget	538.643	1,447.113	2,553.541	0.000	2,553.541
Total Adjustments	-18.852	-77.646	17.091	0.000	17.091
• Congressional General Reductions	0.000	-2.646			
• Congressional Directed Reductions	0.000	-75.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	-18.852	0.000			
• Other Adjustments	0.000	0.000	17.091	0.000	17.091

Congressional Add Details (\$ in Millions, and Includes General Reductions)

Project: 641025: *GROUND BASED STRATEGIC DETERRENT (GBSD)*

Congressional Add: *Congressional Add- Risk Reduction*

Congressional Add: *Congressional Directed Transfer- SLP-A*

Congressional Add Subtotals for Project: 641025

Congressional Add Totals for all Projects

	FY 2020	FY 2021
	65.100	-
	22.022	-
	87.122	-
	87.122	-

Change Summary Explanation

FY2020 funding reflects a Small Business Innovation Research (SBIR) adjustment of \$18.852 million.

FY2021 funding reflects Congressionally Directed Reductions of \$60 million for "excess to need" and \$15 million for "Restoring acquisition accountability: acquisition strategy for planning and design." FY2021 funding also reflects a \$2.646 million Congressional General Reduction for an undistributed mark.

FY2022 funding reflects an increase to fund the program to latest Independent Cost Estimate.

C. Accomplishments/Planned Programs (\$ in Millions)

	FY 2020	FY 2021	FY 2022
Title: Technology Maturation & Risk Reduction (TMRR)	337.864	0.000	0.000
Description: The objectives of TMRR for GBSD were 1) advance GBSD major activities, systems engineering activities, trade-studies, information technology, data management, analytical capabilities and deliver a modular, integrated weapon system preliminary design; and 2) mature technologies related to the major activities and demonstrate performance of sub-system capabilities through prototyping, modeling, and simulation. The TMRR Major Thrust concluded in Fiscal Year 2020.			

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force		Date: May 2021		
Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>		R-1 Program Element (Number/Name) PE 0605230F / <i>Ground Based Strategic Deterrent</i>		
C. Accomplishments/Planned Programs (\$ in Millions)		FY 2020	FY 2021	FY 2022
<p>FY 2021 Plans: N/A</p> <p>FY 2022 Plans: N/A</p> <p>FY 2021 to FY 2022 Increase/Decrease Statement: N/A</p>				
<p>Title: Engineering & Manufacturing Development (EMD)</p> <p>Description: The objectives of EMD for GBSD are: 1) advance GBSD major activities, systems engineering activities, information technology, data management, analytical capabilities and deliver a flexible, integrated weapon system critical design, 2) prototype and test mature technologies related to the major activities and demonstrate performance of sub-system and system capabilities through prototyping and testing and 3) engage in rapid prototyping events to mature future design increments.</p> <p>FY 2021 Plans:</p> <ul style="list-style-type: none"> • Execute the EMD Contract to advance GBSD major activities to include systems engineering activities, information technology, data management, analytical capabilities and deliver a flexible, integrated weapon system critical design. • Modify, modernize, and expand the analytic environment and labs to support EMD activities to enable full execution of the program's capability to own the technical baseline throughout the program life cycle. This involves establishing a digital engineering system including a supporting environment/infrastructure to perform digital activities, collaborate with, and communicate across stakeholders. • Continue to examine and mature air vehicle equipment, command and launch, cybersecurity, operator and maintenance training systems hardware and software, security system architecture, transport sub-systems, and associated ground technologies. Define requirements and modular architectures through trade studies, prototyping, demonstration, and analysis. • Continue to mature and refine weapon system and non-operational software, software integration and development, modular system architecture requirements, and product life-cycle management. • Continue to mature the assessment of the current MM III launch systems to determine, through onsite assessments and analysis, the extent of degradation and evaluate for future upgrade, replacement, preparation, and modernization of operational and test facilities. • Execute all government critical path activities to include but not limited to Preliminary Draft Environmental Impact Statement (PDEIS), Coordinating Draft Environmental Impact Studies (EIS), Environmental Baseline Surveys, and Section 106 Programmatic Agreement. • Continue to mature the weapon system by conducting trade studies, system engineering, test activities, and system modeling and simulation. 		113.657	1,447.113	2,553.541

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force	Date: May 2021
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Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 0605230F / <i>Ground Based Strategic Deterrent</i>
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C. Accomplishments/Planned Programs (\$ in Millions)	FY 2020	FY 2021	FY 2022
<ul style="list-style-type: none"> • Continue to further develop analytical, information technology, and data management capabilities. • Implement information systems and information technology design to support EMD execution. • Modify and expand GBSD workspace to accommodate a growing workforce. • Continue to assess fielding requirements for air vehicle equipment, command & launch, and launch systems and appropriate timelines to transition from MM III to GBSD solution. • Conduct planning for the use of MBSE tools during Operations and Sustainment phase in order to transform ICBM sustainment and supply chain management. • Continue to execute and improve the unified certification strategy which meets nuclear surety, cyber security, and nuclear safety requirements. • Expand and mature the analytical, information technology, test, and data management capabilities to ensure access to weapon system design information is properly controlled and securely transmitted between government and contractors. • Continue to refine Security Classification Guide, update impacts, and implement updates and changes through all Government and contractor programmatic activities. • Continue to increase Federally Funded Research and Development Centers (FFRDC)/University-Affiliated Research Center (UARC) support to maintain the ability to own the technical baseline in EMD. • Continue to mature support systems to include Common Support Equipment (CSE)/Peculiar Support Equipment (PSE) and all transportation equipment. • Plan and execute critical software risk reduction activities. • Expand the Information Systems/Information Technology/Information Assurance infrastructure networks and personnel required to support Top Secret, Special Access Programs, and collateral activities and expand capability at mission partner operating locations and network access points. • Develop, improve & modernize government test capabilities required for successful Developmental Test (DT) and Operational Test (OT) including but not limited to, Vandenberg AFB Test capabilities, Western Range Test capabilities, Broad Ocean Area Terminal Area Scoring Test Capability, improvements to the Air Force Research Lab 1-42 test cell at Edwards AFB and security and capability upgrades at several Arnold Engineering Development Complex test sites. Modernization and improvement of LF-26 at Vandenberg AFB begins in FY21. • Continue integrating requirement for dual-capable, air-based, survivable launch capability. • Develop a common cryptographic device and supporting equipment for use in multiple subsystems and/or networks throughout the GBSD weapon system. • Integrate the Mk-21A Reentry Vehicle (Program 0101328F), ICBM Fuze Modernization (Program 0604933F), and GBSD test programs. • Expand government-owned and government-operated DevSecOps/software stack. <p>FY 2022 Plans:</p>			

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force	Date: May 2021
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Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 0605230F / <i>Ground Based Strategic Deterrent</i>
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C. Accomplishments/Planned Programs (\$ in Millions)	FY 2020	FY 2021	FY 2022
<ul style="list-style-type: none"> • Execute the EMD Contract to advance GBSD major activities to include systems engineering activities, information technology, data management, analytical capabilities and deliver a flexible, integrated weapon system critical design. • Modify, modernize, and expand the analytic environment and labs to support EMD activities to enable full execution of the program's capability to own the technical baseline throughout the program life cycle. This involves establishing a digital engineering system including a supporting environment/infrastructure to perform digital activities, collaborate with, and communicate across stakeholders. • Continue to examine and mature air vehicle equipment, command and launch, cybersecurity, operator and maintenance training systems hardware and software, security system architecture, transport sub-systems, and associated ground technologies. Define requirements and modular architectures through trade studies, prototyping, demonstration, and analysis. • Continue to mature and refine weapon system and non-operational software, software integration and development, modular system architecture requirements, and product life-cycle management. • Continue to mature the assessment of the current MM III launch systems to determine, through onsite assessments and analysis, the extent of degradation and evaluate for future upgrade, replacement, preparation, and modernization of operational and test facilities. • Execute all government critical path activities to include but not limited to Preliminary Draft Environmental Impact Statement (PDEIS), Coordinating Draft Environmental Impact Studies (EIS), Environmental Baseline Surveys, and Section 106 Programmatic Agreement. • Continue to mature the weapon system by conducting trade studies, system engineering, test activities, and system modeling and simulation. • Continue to further develop analytical, information technology, and data management capabilities. • Implement information systems and information technology design to support EMD execution. • Continue to assess fielding requirements for air vehicle equipment, command & launch, and launch systems and appropriate timelines to transition from MM III to GBSD solution. • Conduct planning for the use of MBSE tools during Operations and Sustainment phase in order to transform ICBM sustainment and supply chain management. • Continue to execute and improve the unified certification strategy which meets nuclear surety, cyber security, and nuclear safety requirements. • Expand and mature the analytical, information technology, test, and data management capabilities to ensure access to weapon system design information is properly controlled and securely transmitted between government and contractors. • Continue to refine Security Classification Guide, update impacts, and implement updates and changes through all Government and contractor programmatic activities. • Continue to increase FFRDC/UARC support to maintain the ability to own the technical baseline in EMD. • Continue to mature support systems to include CSE/PSE and all transportation equipment. • Plan and execute critical software risk reduction activities. 			

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force	Date: May 2021
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Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 0605230F / <i>Ground Based Strategic Deterrent</i>
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C. Accomplishments/Planned Programs (\$ in Millions)	FY 2020	FY 2021	FY 2022
<ul style="list-style-type: none"> • Expand the Information Systems/Information Technology/Information Assurance infrastructure networks and personnel required to support Top Secret, Special Access Programs, and collateral activities and expand capability at mission partner operating locations and network access points. • Develop, improve & modernize government test capabilities required for successful Developmental Test (DT) and Operational Test (OT) including but not limited to, Vandenberg AFB Test capabilities, Western Range Test capabilities, Broad Ocean Area Terminal Area Scoring Test Capability, and various Noise, Vibration and Harshness and Nuclear Hardness and Survivability test sites/beds as required. Modernization and improvement of LF-04 at Vandenberg AFB begins in FY22. • Continue integrating requirement for dual-capable, air-based, survivable launch capability. • Develop a common cryptographic device and supporting equipment for use in multiple subsystems and/or networks throughout the GBSD weapon system. • Integrate the Mk-21A Reentry Vehicle (Program 0101328F), ICBM Fuze Modernization (Program 0604933F), and GBSD test programs. • Expand government-owned and government-operated DevSecOps/software stack. • Execute all government critical path activities. • Conduct studies and initiatives to build schedule margin, reduce risk in the Minuteman III-to-GBSD transition, and reduce life cycle costs as the program progresses through the EMD phase to the Production phase. • Modify and expand GBSD workspace at all operating locations to accommodate a growing workforce and provide the tools for the workforce to own the technical baseline. <p><i>FY 2021 to FY 2022 Increase/Decrease Statement:</i> Funds increased due to continued expansion of EMD activities to solidify the GBSD design as well as dedicating resources to build test assets and prepare test sites for GBSD First Flight scheduled in FY24.</p>			
Accomplishments/Planned Programs Subtotals	451.521	1,447.113	2,553.541

	FY 2020	FY 2021
<i>Congressional Add:</i> Congressional Add- Risk Reduction	65.100	-
<i>FY 2020 Accomplishments:</i> <ul style="list-style-type: none"> • Develop digital software factory to reduce software development risk • Develop GBSD Cloud Infrastructure and initiating DevSecOps deployment • Initiate environmental impact studies • Continue to grow the organization in preparation for EMD • Install critical SAP IT infrastructure to protect nuclear program data 		

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600: Research, Development, Test & Evaluation, Air Force I BA 4: Advanced Component Development & Prototypes (ACD&P)	R-1 Program Element (Number/Name) PE 0605230F I Ground Based Strategic Deterrent
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	FY 2020	FY 2021
• Initiate EMD risk reduction activities, to include Guidance Component Life Testing, Booster Ground Testing, and additional Modeling & Simulation activities		
Congressional Add: Congressional Directed Transfer- SLP-A	22.022	-
FY 2020 Accomplishments: • Integrate requirement for dual-capable, air-based, survivable launch capability from the Airborne Launch Control System-Replacement (ALCS-R) program, previously budgeted in Program 0101213F, Project 672983.		
Congressional Adds Subtotals	87.122	-

D. Other Program Funding Summary (\$ in Millions)

<u>Line Item</u>	<u>FY 2020</u>	<u>FY 2021</u>	<u>FY 2022</u> <u>Base</u>	<u>FY 2022</u> <u>OCO</u>	<u>FY 2022</u> <u>Total</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>FY 2026</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• RDTE 04 PE 0603851F: <i>Intercontinental Ballistic Missile - Dem/Val</i>	29.881	32.899	49.621	-	49.621	-	-	-	-	-	-
• MPAF 01 MPAF 01	0.000	0.000	10.895	-	10.895	-	-	-	-	-	-
MGBSD0: GBSD SQU...: <i>GBSD SQUADRONS</i>											
• MILCON PE 0101233F: <i>GBSD SQUADRONS</i>	40.000	89.200	168.099	-	168.099	-	-	-	-	-	-
• O&M PE 0101233F: <i>GBSD SQUADRONS</i>	3.250	3.337	20.001	0.000	20.001	-	-	-	-	-	-

Remarks

E. Acquisition Strategy

The objective of the GBSD program strategy is to deliver a full, integrated weapon system capability that meets Air Force Global Strike Command's Capability Development Document requirements beginning in Fiscal Year 2029. For the Engineering and Manufacturing Development (EMD) phase of this strategy, the Program Office awarded an EMD contract in the 4th quarter of Fiscal Year 2020. The objectives of EMD for GBSD are as follows: 1) to deliver low-risk, technologically mature, integrated weapon system baseline design; 2) develop flexible system architecture with options for future on-ramps and off-ramps to mitigate program risks; 3) embrace MBSE/digital engineering to streamline system development activities and time-lines; 4) align contract incentives to mitigate schedule and performance risk; 5) utilize MBSE processes and tools to create schedule margin and pull surety, safety, cyber, and test activities to the left for time certain delivery; 6) ensure government owns key interfaces and data rights; 7) pursue "smart commonality" with Navy, Space, and Missile Defense Agency. The EMD phase will include an EMD Baseline Review, Critical Design Review, First Flight Test, Full Functional System Test, System Qualification/System Verification Review, Nuclear Certification, Developmental Test, Operational Test, and will culminate with early production and weapon system deployment. The program will also assess the cost and schedule risks associated with

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity	R-1 Program Element (Number/Name)
3600: <i>Research, Development, Test & Evaluation, Air Force I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	PE 0605230F / <i>Ground Based Strategic Deterrent</i>

every requirement. The period of performance for the EMD contract is 4th quarter of Fiscal Year 2020 to the second quarter of Fiscal Year 2028 with 5 options for early production and deployment. These efforts will ultimately extend the capabilities of the ground-based leg of the nuclear triad through 2075.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Air Force											Date: May 2021				
Appropriation/Budget Activity 3600 / 4						R-1 Program Element (Number/Name) PE 0605230F / Ground Based Strategic Det errent					Project (Number/Name) 641025 / GROUND BASED STRATEGIC DETERRENT (GBSD)				

Product Development (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
GBSD TMRR Contractor #1	C/CPFF	Boeing Def, Space, & Sec : Huntsville, AL	242.567	18.548	Oct 2019	-		-		-		-	-	-	261.115
GBSD TMRR Contractor #2	C/CPFF	Northrop Grumman Sys Corp : El Segundo, CA	244.791	125.999	Oct 2019	-		-		-		-	-	-	370.790
GBSD EMD Contract	C/CPIF	Northrop Grumman Sys Corp : El Segundo, CA	0.000	113.657	Sep 2020	1,113.603	Oct 2020	2,193.891	Oct 2021	-		2,193.891	-	-	13,293.563
GBSD Security Classification Guide Compliance	C/FFP	Lockheed Martin Corp : King of Prussia, PA	1.506	0.000	Oct 2019	-		-		-		-	-	-	1.506
Subtotal			488.864	258.204		1,113.603		2,193.891		-		2,193.891	-	-	N/A

Remarks

EMD phase began in the fourth quarter FY20; FY22 funding increase for the continued expansion of EMD activities in solidifying the GBSD design and associated requirements.
 GBSD TMRR Contractor #1- Total Cost lower than Target Value due to contractor decision not to bid for EMD contract and resultant government determination to cease funding for TMRR effort.
 GBSD TMRR Contractor #1 and #2 contracts were modified to include costs for Security Classification Guide Compliance.
 GBSD Security Classification Guide Compliance includes compliance costs for the TMRR unsuccessful Offeror.

Support (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
GBSD Integration Support Contract	C/FFP	BAE : Hill AFB, UT	105.969	40.346	Oct 2019	43.059	Oct 2020	44.668	Oct 2021	-		44.668	-	-	519.735
GBSD Electronic Parts Strategy and Commonality	MIPR	Naval Surface Warfare Center Crane : Crane, IN	13.366	3.643	Nov 2019	4.270	Nov 2020	4.900	Nov 2021	-		4.900	-	-	-
GBSD System Engineering and Acquisition Support	MIPR	Aerospace Corporation : El Segundo, CA	14.431	7.803	Nov 2019	8.832	Nov 2020	9.575	Nov 2021	-		9.575	-	-	-

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Air Force												Date: May 2021			
Appropriation/Budget Activity				R-1 Program Element (Number/Name)				Project (Number/Name)							
3600 / 4				PE 0605230F / Ground Based Strategic Deterrent				641025 / GROUND BASED STRATEGIC DETERRENT (GBSD)							
Support (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
GBSD Acquisition Support and System Engineering	MIPR	MITRE : Bedford, MA	16.801	11.864	Nov 2019	14.035	Nov 2020	15.000	Nov 2021	-		15.000	-	-	-
GBSD Software Engineering Institute	MIPR	Carnegie Mellon : Pittsburgh, PA	3.001	2.079	Nov 2019	2.075	Nov 2020	2.000	Nov 2021	-		2.000	-	-	-
GBSD Reentry Systems (RS) FFRDC Support and Analysis	MIPR	Sandia National Laboratories : Various	18.786	7.750	Oct 2019	3.828	Oct 2020	4.427	Oct 2021	-		4.427	-	-	-
GBSD RS FFRDC Analysis and Acquisition Intelligence Support	MIPR	MIT Lincoln Labs : Lexington, MA	2.862	1.126	Oct 2019	1.300	Oct 2020	1.600	Oct 2021	-		1.600	-	-	-
GBSD Operations Research Analyst Support	C/FFP	Tecolote Research : Hill AFB, UT	2.357	2.365	Oct 2019	3.300	Oct 2020	3.625	Oct 2021	-		3.625	-	-	35.487
GBSD Surety and Certification Engineering Services	MIPR	Various : Various	6.396	3.060	Nov 2019	3.989	Nov 2020	2.500	Nov 2021	-		2.500	-	-	-
GBSD Administrative Support	Various	Various : Various	0.908	4.665	Nov 2019	2.975	Nov 2020	2.975	Jan 2022	-		2.975	-	-	-
GBSD Technical Design Agent for NC2 Codes/ Crypto	MIPR	Sandia National Labs : Various	0.000	6.500	Nov 2019	13.500	Nov 2020	15.200	Nov 2021	-		15.200	-	-	-
GBSD Mantech	RO	Man Tech International : Herndon, VA	2.389	8.615	Dec 2019	9.455	Dec 2020	10.713	Dec 2021	-		10.713	-	-	-
GBSD Civilian Manpower	Various	US Gov Civilians : Hill AFB, UT	6.512	14.416	Oct 2019	25.468	Oct 2020	25.000	Oct 2021	-		25.000	-	-	-
GBSD NEPA Analysis	MIPR	Various : Various	0.000	10.288	Apr 2020	10.935	Oct 2020	1.300	Nov 2021	-		1.300	-	-	-
RV LM OEM Support	C/CPAF	Lockheed Martin Corp : Bethesda, MD	0.000	-		1.350	Jan 2021	2.000	Dec 2021	-		2.000	-	-	-
GBSD Enterprise Support	C/Various	Various : Various	10.685	0.699	Oct 2019	1.956	Oct 2020	0.650	Dec 2021	-		0.650	-	-	-
Subtotal			204.463	125.219		150.327		146.133		-		146.133	-	-	N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0605230F / Ground Based Strategic Det errent	Project (Number/Name) 641025 / GROUND BASED STRATEGIC DETERRENT (GBSD)
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Support (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			

Remarks
 GBSD is spearheading the Owning The Technical Baseline (OTTB) approach for system acquisition. This approach utilizes additional support efforts that would typically be performed by a Prime Contractor thus increasing costs within Cost Category Items.
 GBSD OASIS A&AS Support renamed GBSD Administrative Support.
 GBSD Technical Area Task Support (TMRR) completed and prior year funding amounts were incorporated into the GBSD Enterprise Support line.
 GBSD Civilian Manpower increases due to increased DCA allocations in order to support EMD and are in addition to any other planned civilian hiring.
 GBSD Environmental Analysis requirements have been moved to the GBSD NEPA Analysis.

Test and Evaluation (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
GBSD Cybersecurity, Test and Evaluation Framework, Codes/Crypto	MIPR	Johns Hopkins University-Applied Physics Lab : Laurel, MD	24.750	13.200	Oct 2019	15.008	Oct 2020	15.500	Oct 2021	-		15.500	-	-	-
GBSD Integrated Test Team	PO	Arnold Engineering Development Complex : Arnold AFB, TN	8.986	6.048	Oct 2019	11.219	Oct 2020	16.630	Oct 2021	-		16.630	-	-	-
GBSD Independent Operational Test Agency	PO	Air Force Operational Test and Evaluation Center : Hill AFB, UT	2.463	1.848	Oct 2019	3.860	Oct 2020	5.065	Oct 2021	-		5.065	-	-	-
GBSD Integrated Threat Analysis and Simulation Environment (ITASE) 1	MIPR	DIA-Missile and Space Intelligence Center : Redstone Arsenal, AL	9.461	5.600	Nov 2019	5.500	Nov 2020	5.000	Nov 2021	-		5.000	-	-	-
GBSD ITASE 2	MIPR	National Air and Space Intelligence Center : Fairborn, OH	1.783	0.300	Nov 2019	0.150	Dec 2020	1.000	Nov 2021	-		1.000	-	-	-
GBSD Nuclear Dust and Debris Environments Study	MIPR	Air Force Research Lab : Wright Patterson AFB, OH	2.284	0.400	Nov 2019	0.878	Nov 2020	0.000		-		0.000	-	-	-

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0605230F / Ground Based Strategic Deterrent	Project (Number/Name) 641025 / GROUND BASED STRATEGIC DETERRENT (GBSD)
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Test and Evaluation (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
GBSD Launch Systems LF-26 (TMRR)	Various	Various : Various	0.041	0.511	Oct 2019	0.025	Dec 2020	0.000		-		0.000	-	-	-
GBSD Software Support	PO	309th / 517th SWEG : Hill AFB, UT	5.479	11.870	Oct 2019	23.283	Oct 2020	26.206	Oct 2021	-		26.206	-	-	-
GBSD NSCCA Support	PO	309th / 516th SWES : Hill AFB, UT	0.000	5.400	Oct 2019	8.300	Oct 2020	11.750	Oct 2021	-		11.750	-	-	-
GBSD Instrument Testing	MIPR	Aerospace Corporation : El Segundo, CA	1.824	5.200	Nov 2019	-		0.320	Nov 2021	-		0.320	-	-	-
GBSD / Missile Defense Agency Silo Fly-out Modelling / Simulation Development	MIPR	Various : Various	0.900	5.191	Nov 2019	5.733	Nov 2020	6.960	Nov 2021	-		6.960	-	-	-
GBSD Rapid Assessment Technology / LS Support	MIPR	Various : Various	0.270	4.670	Apr 2020	6.100	Mar 2021	6.000	Mar 2022	-		6.000	-	-	-
GBSD Joint Test Assembly Encryption	MIPR	Sandia National Labs : Various	1.500	6.200	Nov 2019	13.000	Dec 2020	10.700	Dec 2021	-		10.700	-	-	-
GBSD Joint Environment Test Unit / Joint Test Assembly National Nuclear Security Agency Cost Share	MIPR	Various : Various	1.500	2.000	Nov 2019	1.200	Dec 2020	0.940	Dec 2021	-		0.940	-	-	-
NSWC Corona Support	MIPR	Naval Surface Warfare Center : Corona, CA	0.000	0.600	May 2020	1.149	Dec 2020	1.201	Dec 2021	-		1.201	-	-	-
GBSD Enterprise Test and Assessments	C/Various	Various : Various	7.265	1.388		0.045	Nov 2020	0.302	Nov 2021	-		0.302	-	-	-
Subtotal			68.506	70.426		95.450		107.574		-		107.574	-	-	N/A

Remarks
 GBSD RS Test and Advanced Technology Interface (TMRR) completed and prior year funding amounts were incorporated into the GBSD Enterprise Test and Assessments line.
 GBSD Defense Accelerator (TMRR) has completed and prior year funding amounts were incorporated into the GBSD Enterprise Test and Assessments line.
 GBSD NSCCA Support addresses Nuclear Safety Cross-Check Analysis (NSCCA) software support and funds 40 FTEs in FY22.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0605230F / Ground Based Strategic Det errent	Project (Number/Name) 641025 / GROUND BASED STRATEGIC DETERRENT (GBSD)
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Test and Evaluation (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			

GBSD Test Vehicles, GBSD Booster Ground Test, GBSD Guidance, Navigation, and Control Instruments for Developmental Testing, and GBSD Reentry System/Reentry Vehicle Modelling/Simulation Environment Development items moved to the Product Development section under the EMD Prime Contract.
GBSD Software Support will fund 102 FTEs in FY22.

Management Services (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
GBSD Integration Support Contract	C/FFP	BAE : Hill AFB, UT	57.052	21.724	Oct 2019	22.741	Nov 2020	23.590	Oct 2021	-		23.590	-	-	277.170
GBSD Electronics Parts Strategy and Commonality	C/Various	Naval Surface Warfare Center : Crane, IN	5.728	0.911	Nov 2019	1.830	Nov 2020	2.100	Nov 2021	-		2.100	-	-	-
GBSD System Engineering and Acquisition Support	C/Various	Aerospace Corporation : El Segundo, CA	17.638	9.536	Nov 2019	10.795	Nov 2020	11.703	Nov 2021	-		11.703	-	-	-
GBSD IS/IT Support	C/Various	Various : Various	22.515	11.654	Oct 2019	6.441	Oct 2020	12.000	Oct 2021	-		12.000	-	-	-
GBSD DevSecOps, Cloud, & Infrastructure	Various	Various : Various	0.270	25.513	Nov 2019	32.536	Nov 2020	40.000	Nov 2021	-		40.000	-	-	-
GBSD PMA	Various	Various : Various	10.377	15.456	Oct 2019	13.390	Oct 2020	16.550	Oct 2021	-		16.550	-	-	-
Subtotal			113.580	84.794		87.733		105.943		-		105.943	-	-	N/A

Remarks
GBSD Enterprise Infrastructure has been incorporated into GBSD DevSecOps.

	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	875.413	538.643	1,447.113	2,553.541	-	2,553.541	-	-	N/A

Remarks

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Exhibit R-4A, RDT&E Schedule Details: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0605230F / <i>Ground Based Strategic Deterrent</i>	Project (Number/Name) 641025 / <i>GROUND BASED STRATEGIC DETERRENT (GBSD)</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
Ground Based Strategic Deterrent (GBSD)				
TMRR Phase	1	2020	4	2020
9th Quarter Technical Interchange Meeting (Dec 2019)	1	2020	1	2020
Software Specification Review (Feb 2020)	2	2020	2	2020
Preliminary Design Review (Apr 2020)	3	2020	3	2020
Milestone B (Aug 2020)	4	2020	4	2020
EMD Phase	4	2020	4	2026
Critical Design Review (Jul 2023)	4	2023	4	2023
Milestone C (May 2026)	3	2026	3	2026

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force</i> / BA 4: <i>Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 0207100F / <i>Light Attack Armed Reconnaissance (LAAR) Squadrons</i>
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COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
Total Program Element	-	1.982	0.000	0.000	0.000	0.000	-	-	-	-	-	-
643865: <i>Light Attack</i>	-	1.982	0.000	0.000	0.000	0.000	-	-	-	-	-	-

A. Mission Description and Budget Item Justification

The Light Attack Aircraft (LAA) platform increases combat capability and readiness at reduced operating costs for missions in permissive environments. LAA executes under a middle tier rapid fielding acquisition strategy pursuant to Section 804 of the FY16 National Defense Authorization Act. The LAA option offers flexibility and accelerates modernization of current and potential partner forces who do not require advanced fighter aircraft. The LAA effort supports the National Defense Strategy to counter violent extremism on a global scale, alongside allies and partners

FY21 Funding transferred to SOCOM

This program element may include necessary civilian pay expenses required to manage, execute, and deliver LAAR weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program element 0605831F

This effort is in Budget Activity 4, Advanced Component Development and Prototypes (ACD&P), because efforts are necessary to evaluate integrated technologies, representative modes or prototype systems in a high fidelity and realistic operating environment.

B. Program Change Summary (\$ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Previous President's Budget	2.000	0.014	0.000	0.000	0.000
Current President's Budget	1.982	0.000	0.000	0.000	0.000
Total Adjustments	-0.018	-0.014	0.000	0.000	0.000
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	-0.014			
• SBIR/STTR Transfer	-0.018	0.000			
• Other Adjustments	0.000	0.000	0.000	0.000	0.000

Change Summary Explanation

No Significant Changes

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0207100F / <i>Light Attack Armed Reconnaissance (LAAR) Squadrons</i>	Project (Number/Name) 643865 / <i>Light Attack</i>
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COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
643865: <i>Light Attack</i>	-	1.982	0.000	0.000	0.000	0.000	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-	-	-

A. Mission Description and Budget Item Justification

The Light Attack Aircraft (LAA) platform increases combat capability and readiness at reduced operating costs for missions in permissive environments. LAA executes under a middle tier rapid fielding acquisition strategy pursuant to Section 804 of the FY16 National Defense Authorization Act. The LAA option offers flexibility and accelerates modernization of current and potential partner forces who do not require advanced fighter aircraft. The LAA effort supports the National Defense Strategy to counter violent extremism on a global scale, alongside allies and partners.

LAA squadrons will provide a deployable and sustainable multirole attack capability, capable of performing a diverse array of attack missions, including but not limited to, Close Air Support (CAS), Armed Reconnaissance, Strike Coordination and Reconnaissance (SCAR), Airborne Forward Air control (FAC-A), and Interdiction. Other tasks for which Light Attack aircraft is expected to be suitable include Combat Search and Rescue (CSAR), Rescue Escort (RESCORT), and Maritime Air Support (MAS). LAA squadrons executing these tasks allows our 4th and 5th Generation fighter fleets to implement a tailored training regimen to address declining core mission readiness and focus on preparing to deter or prevail in conflicts with peer adversaries. LAA will provide a deployable, persistent attack capability that can be employed with low footprint and light logistical support requirements.

Phase III of the Light Attack experiment will seek to identify, assess and mature tactics, techniques, and procedures (TTPs) for coalition low-end counter-land operations, and assess TTPs using various networked capability packages while measuring the success and timeliness of "find-fix-track-target-engage-assess" (F2T2EA) operations. \$2.0M will be used to complete support of experimentation activities under this PE prior to transition to ACC.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver the Light Attack weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program element 0605831F

B. Accomplishments/Planned Programs (\$ in Millions)

	FY 2020	FY 2021	FY 2022
Title: LAA	1.982	0.000	-
Description: Prior Year funding include \$100M of 2018 RDT&E in PE 0604858F 'Tech Transition'. Funds provided to demonstrate, prototype and experiment with technologies and concepts to enable or accelerate their transition to acquisition programs and/or operational use.			
FY 2021 Plans: N/A - Funding transferred to SOCOM			
FY 2021 to FY 2022 Increase/Decrease Statement:			

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0207100F / <i>Light Attack Armed Reconnaissance (LAAR) Squadrons</i>	Project (Number/Name) 643865 / <i>Light Attack</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2020	FY 2021	FY 2022
N/A - Funding transferred to SOCOM			
Accomplishments/Planned Programs Subtotals	1.982	0.000	-

C. Other Program Funding Summary (\$ in Millions)

<u>Line Item</u>	<u>FY 2020</u>	<u>FY 2021</u>	<u>FY 2022</u> <u>Base</u>	<u>FY 2022</u> <u>OCO</u>	<u>FY 2022</u> <u>Total</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>FY 2026</u>	<u>Cost To Complete</u>	<u>Total Cost</u>
• APAF 04 OAX000: <i>Observation Attack Replacement (OA-X)</i>	30.000	0.000	0.000	-	0.000	-	-	-	-	-	-

Remarks

D. Acquisition Strategy

The LAA acquisition strategy is anticipated to utilize other transaction agreements for prototyping purposes pursuant to 10 U.S.C. § 2371b.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0207100F / <i>Light Attack Armed Reconnaissance (LAAR) Squadrons</i>	Project (Number/Name) 643865 / <i>Light Attack</i>
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Product Development (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Product Development	C/CPAF	Not specified. : TBD	-	1.241	Feb 2021	0.000		0.000		0.000		0.000	-	-	-
Subtotal			-	1.241		0.000		0.000		0.000		0.000	-	-	N/A

Test and Evaluation (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Test and Evaluation	C/CPAF	Not specified. : TBD	-	0.168	Apr 2021	0.000		0.000		0.000		0.000	-	-	-
Subtotal			-	0.168		0.000		0.000		0.000		0.000	-	-	N/A

Management Services (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Management Services	C/CPAF	Not specified. : TBD	-	0.573	Aug 2021	0.000		0.000		0.000		0.000	-	-	-
Subtotal			-	0.573		0.000		0.000		0.000		0.000	-	-	N/A

			Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals			-	1.982	0.000	0.000	0.000	0.000	-	-	N/A

Remarks
Dec 2020 award date for BPAC 643865 (Light Attack) is correct and should be in FY21 as well as the \$2M, but due to ABIDES being locked it cannot be moved out of FY20.

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Exhibit R-4, RDT&E Schedule Profile: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0207100F / <i>Light Attack Armed Reconnaissance (LAAR) Squadrons</i>	Project (Number/Name) 643865 / <i>Light Attack</i>
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FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

LAA	
Experimentation	[REDACTED]

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Exhibit R-4A, RDT&E Schedule Details: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0207100F / <i>Light Attack Armed Reconnaissance (LAAR) Squadrons</i>	Project (Number/Name) 643865 / <i>Light Attack</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
LAA				
Experimentation	1	2021	4	2021

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 0207110F / <i>Next Generation Air Dominance</i>
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COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
Total Program Element	-	872.539	902.440	1,524.667	0.000	1,524.667	-	-	-	-	-	-
646007: <i>AS 2030 Air Dominance Technologies (ADT)</i>	-	872.539	902.440	1,524.667	0.000	1,524.667	-	-	-	-	-	-

A. Mission Description and Budget Item Justification

Next Generation Air Dominance (NGAD) is a portfolio of technologies enabling Air Superiority for the Joint Force in the most challenging operational environments. The NGAD program is directed by Joint Requirements Oversight Council Memorandum (JROCM) 043-13 and CSAF approved Air Superiority Enterprise Capability Collaboration Team (ECCT) Flight Plan. The program matures technology and reduces risk through development, integration, and test activities. Key NGAD attributes include enhancements in survivability, lethality, persistence, and interoperability across a range of military operations. Program activities will also include the employment of digital acquisitions through the application of digital engineering, agile software development, and open systems architectures. Funding provides program management support, operational concept exploration, technology studies, multi-domain integration assessments, operational and system architecture development, maturation and risk reduction of air superiority related technologies, including weapons systems and integrated system concept development and demonstration. NGAD technologies are available to other DoD systems based on emerging threats, AF priorities, and development capacity. DoD systems incorporating NGAD technologies will include development, integration, and testing of capabilities.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver weapon system capability. The use of such programs funds would be in addition to the civilian pay expenses budgeted in program element 0605831F. In FY20 \$9.217M expended and in FY21 \$11.497M is estimated for civilian pay expenses in this program element.

This effort is in Budget Activity 4, Advanced Component Development and Prototypes (ACD&P), because efforts are necessary to evaluate integrated technologies, representative modes or prototype systems in a high fidelity and realistic operating environment.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force	Date: May 2021
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Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 0207110F / <i>Next Generation Air Dominance</i>
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B. Program Change Summary (\$ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Previous President's Budget	905.000	1,044.089	1,542.654	0.000	1,542.654
Current President's Budget	872.539	902.440	1,524.667	0.000	1,524.667
Total Adjustments	-32.461	-141.649	-17.987	0.000	-17.987
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	-141.649			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	-32.461	0.000			
• Other Adjustments	0.000	0.000	-17.987	0.000	-17.987

Change Summary Explanation

FY20: -\$32.461M SBIR

FY21: -\$140M Program Congressional Mark due to "forward financing of development efforts" and -\$1.649M Undistributed Mark

FY22: -\$17.987M Other Adjustments, -\$3.624M FY22 program offset and -\$14.363 Non-Pay/Non-Fuel Inflation

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force										Date: May 2021		
Appropriation/Budget Activity 3600 / 4					R-1 Program Element (Number/Name) PE 0207110F / Next Generation Air Dominance				Project (Number/Name) 646007 / AS 2030 Air Dominance Technologies (ADT)			
COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
646007: AS 2030 Air Dominance Technologies (ADT)	-	872.539	902.440	1,524.667	0.000	1,524.667	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Next Generation Air Dominance (NGAD) is a portfolio of technologies enabling Air Superiority for the Joint Force in the most challenging operational environments. The NGAD program is directed by Joint Requirements Oversight Council Memorandum (JROCM) 043-13 and CSAF approved Air Superiority Enterprise Capability Collaboration Team (ECCT) Flight Plan. The program matures technology and reduces risk through development, integration, and test activities. Key NGAD attributes include enhancements in survivability, lethality, persistence, and interoperability across a range of military operations. Program activities will also include the employment of digital acquisitions through the application of digital engineering, agile software development, and open systems architectures. Funding provides program management support, operational concept exploration, technology studies, multi-domain integration assessments, operational and system architecture development, maturation and risk reduction of air superiority related technologies, including weapons systems and integrated system concept development and demonstration. NGAD technologies are available to other DoD systems based on emerging threats, AF priorities, and development capacity. DoD systems incorporating NGAD technologies will include development, integration, and testing of capabilities.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver NGAD weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program element 0605831F. NGAD civilian pay is executed in program element 0207110F. In FY20 \$9.217M expended and in FY21 \$11.497M is estimated for civilian pay expenses in this program element.

FY22 funding totals include 1524.667M requested for the Pacific Defense Initiative.

B. Accomplishments/Planned Programs (\$ in Millions)

	FY 2020	FY 2021	FY 2022
Title: 2030+ Air Dominance	872.539	902.440	1,524.667
Description: The 2030+ Air Dominance (AD) candidate concepts consist of operational analyses, threat studies and technology candidate assessments and prototyping to identify operational concepts and technologies that improve persistence, survivability, lethality, connectivity, interoperability and affordability in 2030 and beyond. These efforts will provide for contractors to conduct analyses, identify technology candidates and perform concept refinement. Furthermore, studies are required to develop operational/system architectures to include family of systems and system of systems. In addition, technical risk reduction activities will be performed to include development, integration, test and building demonstrative prototypes.			
The 2030+ AD working groups methodically assessed candidate concepts using USAF directives and guidance. Resulting concepts informed the NGAD Analysis of Alternatives (AoA), which was completed in 2019. Ongoing studies are conducted to			

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0207110F / <i>Next Generation Air Domina nce</i>	Project (Number/Name) 646007 / <i>AS 2030 Air Dominance Technologies (ADT)</i>

B. Accomplishments/Planned Programs (\$ in Millions)

	FY 2020	FY 2021	FY 2022
refine system concepts and operational/system architectures incorporating family of systems and system of systems that may be required to inform and support strategic choices. In addition, technical risk reduction studies concerning technology integration, operational and system trade space utilizing preliminary data from AD concept development have resulted in multiple activities and engagements to inform strategic USAF experimentation and prototyping efforts. Finally, technical overviews were presented to the Air Force - Scientific Advisory Board (AF-SAB) and other senior leaders.			
<i>FY 2021 Plans:</i> NGAD continues to conduct analyses, identify technology candidates and perform concept refinements. Studies required to develop operational/system architectures to include family of systems and system of systems are maturing. Technical risk reduction activities continue to be performed to include development, integration, test and building demonstrative prototypes. Program activities also include the pursuit of open architecture solutions.			
<i>FY 2022 Plans:</i> NGAD will continue to conduct analyses, identify technology candidates and perform concept refinements. Studies required to develop operational/system architectures to include family of systems and system of systems will also mature. Technical risk reduction activities will continue to be performed to include development, integration, test and building demonstrative prototypes. Program activities will include the pursuit of open architecture solutions.			
<i>FY 2021 to FY 2022 Increase/Decrease Statement:</i> Funding increased due to program increasing technology maturation, risk reduction activities, and hardware prototyping efforts			
Accomplishments/Planned Programs Subtotals	872.539	902.440	1,524.667

C. Other Program Funding Summary (\$ in Millions)

N/A

Remarks

D. Acquisition Strategy

The Next Generation Air Dominance acquisition strategy is based on top-down, multi-domain capabilities development planning and oversight framework. Cross-functional teams will conduct analysis, demonstrations, and experiments to quantify the operational value of alternative concepts and technologies to provide solutions to current and future air superiority capability gaps.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0207110F / Next Generation Air Dominance	Project (Number/Name) 646007 / AS 2030 Air Dominance Technologies (ADT)
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Product Development (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
NGAD Research/ Development Efforts	Various	Various : Various	-	850.667		870.088		1,487.535		-		1,487.535	-	-	-
Subtotal			-	850.667		870.088		1,487.535		-		1,487.535	-	-	N/A

Remarks
Contractual specifics are not available at this level of security classification.

Management Services (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
NGAD Acquisition Support	Various	Various : Various	-	21.872		32.352		37.132		-		37.132	-	-	-
Subtotal			-	21.872		32.352		37.132		-		37.132	-	-	N/A

Remarks
Includes civilian pay

	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	-	872.539	902.440	1,524.667	-	1,524.667	-	-	N/A

Remarks
Details of contract data are not shown because of the level of security classification.

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Exhibit R-4, RDT&E Schedule Profile: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0207110F / Next Generation Air Domina nce	Project (Number/Name) 646007 / AS 2030 Air Dominance Technologies (ADT)

FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

AS 2030 Air Dominance Technologies (ADT)	
Concept Exploration	
Integration Studies	
Technology Risk Reduction / Prototyping	
FY22 Strategic Planning Choices Presented	
FY23 Strategic Planning Choices Presented	
FY24 Strategic Planning Choices Presented	
FY25 Strategic Planning Choices Presented	
FY26 Strategic Planning Choices Presented	
FY27 Strategic Planning Choices Presented	
FY28 Strategic Planning Choices Presented	

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Exhibit R-4A, RDT&E Schedule Details: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0207110F / <i>Next Generation Air Dominance</i>	Project (Number/Name) 646007 / <i>AS 2030 Air Dominance Technologies (ADT)</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>AS 2030 Air Dominance Technologies (ADT)</i>				
Concept Exploration	1	2020	4	2026
Integration Studies	1	2020	4	2026
Technology Risk Reduction / Prototyping	1	2020	4	2026
FY22 Strategic Planning Choices Presented	1	2020	1	2020
FY23 Strategic Planning Choices Presented	1	2021	1	2021
FY24 Strategic Planning Choices Presented	1	2022	1	2022
FY25 Strategic Planning Choices Presented	1	2023	1	2023
FY26 Strategic Planning Choices Presented	1	2024	1	2024
FY27 Strategic Planning Choices Presented	1	2025	1	2025
FY28 Strategic Planning Choices Presented	1	2026	1	2026

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 0207455F / <i>Three Dimensional Long-Range Radar (3DELRR)</i>
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COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
Total Program Element	0.000	22.469	19.321	0.000	0.000	0.000	-	-	-	-	-	-
646002: <i>Three Dimensional Expeditionary Long Range Radar</i>	0.000	22.469	19.321	0.000	0.000	0.000	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-	-	-

Program MDAP/MAIS Code: 393

A. Mission Description and Budget Item Justification

The Three-Dimensional Expeditionary Long-Range Radar (3DELRR) Rapid Prototyping Middle Tier Acquisition (MTA) program will be the principal USAF long-range, ground-based sensor for detecting, identifying, tracking and reporting aerial tracks for the Joint Force Air Component Commander (JFACC) through the Theater Air Control System. The 3DELRR system will provide multiple benefits and increased capabilities to the USAF and to the Joint Services: 1) Replace the aging USAF AN/TPS-75 radar system, which is at the end of its service life and costly to maintain; 2) Detect and track highly maneuverable, small radar cross section air-breathing targets; 3) Mitigate reliability, operational availability, maintainability, transportability and sustainability issues, which plague the AN/TPS-75 radar system; 4) Enable greater battlefield and battlespace awareness through its precise, real-time air picture of sufficient quality to control individual aircraft under a wide range of environmental and operational conditions and 5) Provide exchange of information to the United States Marine Corps, Navy, and Army via appropriate interfaces.

The Air Force conducted a radar market survey in 2019 and identified multiple production-ready alternatives capable of meeting or exceeding 3DELRR requirements at this time. In FY20, the Air Force re-designated 3DELRR as a Middle-Tier Acquisition rapid prototyping effort to demonstrate in FY20 the performance of production-ready systems for meeting 3DELRR requirements.

Based upon the new strategy, the Air Force has removed program funding from fiscal years FY22-FY26 and will use the FY20 prototype capability demonstration results to inform the FY22 budget request.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver 0207455F weapon system capability. The use of such programs funds would be in addition to the civilian pay expenses budgeted in program element 0207455F. In FY20 \$0M and in FY21 \$0.M was expended for civilian pay expenses in this program element.

This effort is in Budget Activity 4, Advanced Component Development and Prototypes (ACD&P), because efforts are necessary to evaluate integrated technologies, representative modes or prototype systems in a high fidelity and realistic operating environment.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600: Research, Development, Test & Evaluation, Air Force I BA 4: Advanced Component Development & Prototypes (ACD&P)	R-1 Program Element (Number/Name) PE 0207455F I Three Dimensional Long-Range Radar (3DELRR)
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B. Program Change Summary (\$ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Previous President's Budget	23.190	19.356	0.000	0.000	0.000
Current President's Budget	22.469	19.321	0.000	0.000	0.000
Total Adjustments	-0.721	-0.035	0.000	0.000	0.000
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	-0.721	-0.035			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	0.000	0.000			
• Other Adjustments	0.000	0.000	0.000	0.000	0.000

C. Accomplishments/Planned Programs (\$ in Millions)	FY 2020	FY 2021	FY 2022
<p>Title: Demonstration & Integration of Production-Ready System to meet 3DELRR capabilities</p> <p>Description: Collaborative acquisition effort to conduct operational assessment - demonstration of viable, production ready prototypes.</p> <p>FY 2021 Plans: Activities will include but are not limited to the following: - Will continue to lead and manage program through daily interaction with contractor and key stakeholders - Will continue efforts for interoperability with external agencies as required - Will continue to identify, monitor, mitigate and report program and known risks associated with hardware, software and testing - Will continue required system and sub-system certification work - Will continue the development of technical manuals and training material - Will continue and complete demonstrations of viable radars and conduct technical reviews - Will continue preparation of production decision and associated documentation - Will begin system integration & interoperability with operational Command and Control (C2) systems - Will initiate contractor integration testing of components & subsystems - Will conduct Test Readiness Reviews (TRRs) prior to specific operational & integration test events</p> <p>FY 2022 Plans: Activities will include but are not limited to the following: -Will continue to lead and manage program through daily interaction with contractor and key stakeholders -Will continue efforts for interoperability with external agencies as required</p>	4.418	12.693	0.000

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force		Date: May 2021		
Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>		R-1 Program Element (Number/Name) PE 0207455F / <i>Three Dimensional Long-Range Radar (3DELRR)</i>		
C. Accomplishments/Planned Programs (\$ in Millions)		FY 2020	FY 2021	FY 2022
<ul style="list-style-type: none"> -Will develop, test, and implement select Contractor Proposed Enhancements based on mission needs -Will continue to identify, monitor, mitigate and report program and known risks associated with hardware, software and testing -Will continue required system and sub-system certification work -Will continue the development of technical manuals and training material -Will continue and complete demonstrations of viable radars and conduct technical reviews -Will continue preparation of follow on production decision and associated documentation -Will begin system integration & interoperability with operational Command and Control (C2) systems -Will initiate contractor integration testing of components & subsystems -Will conduct Test Readiness Reviews (TRRs) prior to specific operational & integration test events <p>FY 2021 to FY 2022 Increase/Decrease Statement: FY22 funding increased to pursue Middle Tier Acquisition rapid prototyping with operational assessment demonstrations and system integration of viable production-ready alternatives. The Air Force will select a capability that meets 3DELRR requirements for a production decision in FY21.</p>				
<p>Title: Government Development, Operational & Integration Test and Evaluation Planning and Execution</p> <p>Description: Planning and execution of Government development, operational, integration test and evaluation.</p> <p>FY 2021 Plans: Activities will include but are not limited to the following:</p> <ul style="list-style-type: none"> - Will continue to receive and evaluate contractor test data: tailor lessons for Government operational & integration testing - Will continue 3DELRR Mobility Testing - Will continue efforts for interoperability with external agencies as required - Will continue development and refinement of TEMP and other test planning documentation - Will continue to integrate Modeling and Simulation (M&S) into test plans - Will continue cybersecurity planning - Will witness formal contractor test integration events - Will conduct Test Readiness Review (TRR) to support Government Developmental Test & Evaluation (DT&E) - Will conduct training and travel in preparation for Government operational & integration testing - Will conduct system integration and interoperability with operational C2 systems architecture and software <p>FY 2022 Plans: Activities will include but are not limited to the following:</p> <ul style="list-style-type: none"> -Will conduct cybersecurity testing -Will conduct Integrated contractor/government DT&E to characterize performance and cyber posture 		18.051	6.628	0.000

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force	Date: May 2021
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Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 0207455F / <i>Three Dimensional Long-Range Radar (3DELRR)</i>
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C. Accomplishments/Planned Programs (\$ in Millions)	FY 2020	FY 2021	FY 2022
<ul style="list-style-type: none"> -Will verify, validate, and accredit modeling and simulation tools for use in test -Will continue to lead and manage program through daily interaction with contractor and key stakeholders -Will Continue efforts for interoperability with external agencies as required -Will continue to identify, monitor, mitigate and report program and known risks associated with hardware, software and testing -Will continue required system and sub-system certification work (eg transportation IFF, etc.) -Will continue the development of technical manuals and training material -Will continue and complete demonstrations of viable radars and conduct technical reviews -Will continue preparation of production decision and associated documentation -Will begin system integration & interoperability with operational Command and Control (C2) systems -Will initiate contractor integration testing of components & subsystems -Will conduct Test Readiness Reviews (TRRs) prior to specific operational & integration test events -Will conduct Test Readiness Reviews (TRRs) to support Government Developmental Test & Evaluation (DT&E) <p><i>FY 2021 to FY 2022 Increase/Decrease Statement:</i> FY22 funding increased to pursue Middle Tier Acquisition rapid prototyping with operational assessment demonstrations and system integration of viable production-ready alternatives. The Air Force will select a capability that meets 3DELRR requirements for a production decision in FY21.</p>			
Accomplishments/Planned Programs Subtotals	22.469	19.321	0.000

D. Other Program Funding Summary (\$ in Millions)

N/A

Remarks

E. Acquisition Strategy

The previous 3DELRR strategy was a single-step acquisition approach for full capability to develop, produce and field a highly capable and sustainable, expeditionary long-range radar. A limited competition was conducted for the Engineering and Manufacturing Development (EMD) contract among the multiple contractors that participated in two Technology Maturation and Risk Reduction (TMRR) phases. The EMD contract was awarded 11 May 2017 to a single developer to complete the final design, build, integration and test of the 3DELRR system.

Due to chronic technical challenges rooted in current EMD contractor's proposed TPS-81 design and subsequent schedule delays, the USAF began conclusion of the current EMD contract in January 2020. The Milestone Decision Authority (MDA) directed a Middle-Tier Acquisition rapid-prototyping approach to accelerate capability delivery, pursuant to FY16 NDAA Section 804 guidance.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity	R-1 Program Element (Number/Name)
3600: <i>Research, Development, Test & Evaluation, Air Force I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	PE 0207455F / <i>Three Dimensional Long-Range Radar (3DELRR)</i>

The current 3DELRR strategy is to implement rapid-prototyping, conduct operational assessment demonstrations of viable production-ready alternatives in FY20, and select the best solution that meets 3DELRR requirements in order to make the initial production decision in FY21. Intend to award production options to a single vendor in FY22. This strategy has the potential to deliver capability to the field no later than FY24.

Test activities planned for FY22 include but are not limited to rapid-prototyping, demonstration and tailored Developmental Integration Test.

The MDA for the 3DELRR program is the Assistant Secretary of the Air Force (Acquisition). The Air Force Program Executive Officer (PEO) for Digital Directorate (AFPEO) located at Hanscom AFB, MA is the PEO for 3DELRR. The Air Force Life Cycle Management Center (AFLCMC) located at Wright-Patterson AFB, OH is the contracting authority for the 3DELRR program. AFLCMC provides contracting, legal, comptroller, programmatic, engineering, test and logistics support.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0207455F / <i>Three Dimensional Long-Range Radar (3DELRR)</i>	Project (Number/Name) 646002 / <i>Three Dimensional Expeditionary Long Range Radar</i>
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Product Development (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Demonstration & Integration (Rapid-Prototyping)	C/TBD	Not specified. : TBD	0.000	2.029	Apr 2020	7.874	Nov 2020	-		-		-	-	-	-
EMD Phase (Prime Contract)	C/FPIF	Raytheon : Woburn, MA	0.000	-		-		-		-		-	-	-	56.640
Subtotal			0.000	2.029		7.874		-		-		-	-	-	N/A

Remarks
 FINANCIAL PERFORMANCE: 3DELRR is evaluated against traditional Research and Development (R&D) program expenditure benchmarks. Unlike many traditional R&D programs, however, the 3DELLR EMD contract is a FPIF contract with progress payments. Twenty percent of incurred costs were withheld until the end of the contract, when they were liquidated. Mandatory funding obligations and progress payment withholds will cause the program to lag traditional expenditure benchmarks, painting an inaccurate portrait of overall program health.

 Due to chronic technical challenges rooted in current EMD contractor's proposed TPS-81 design and subsequent schedule delays, the USAF began conclusion of the current EMD contract after final FPIF contract progress payment in FY19.

Support (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Support	C/CPAF	Not specified. : TBD	0.000	-		-		-		-		-	-	-	-
System Engineering - A	SS/CPFF	MIT/Lincoln Laboratory : Lexington, MA	0.000	1.139	Nov 2019	0.922	Nov 2020	-		-		-	-	-	-
System Engineering - C	SS/CPFF	GTRI : Atlanta, GA	0.000	0.527	Feb 2020	0.555	Feb 2021	-		-		-	-	-	-
System Engineering - D	SS/CPFF	MITRE : Bedford, MA	0.000	3.081	Oct 2019	3.560	Oct 2020	-		-		-	-	-	-
Subtotal			0.000	4.747		5.037		-		-		-	-	-	N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0207455F / Three Dimensional Long-Range Radar (3DELRR)	Project (Number/Name) 646002 / Three Dimensional Expeditionary Long Range Radar
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Test and Evaluation (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Test and Evaluation	C/CPAF	Not specified. : TBD	0.000	-		-		-		-		-	-	-	-
Government Developmental Test and Evaluation Planning and Preparation	PO	46 TS : Eglin AFB, FL	0.000	11.051	Jan 2020	1.843	Jan 2021	-		-		-	-	-	-
Subtotal			0.000	11.051		1.843		-		-		-	-	-	N/A

Remarks
FY21 decreased funding in Test and Evaluation reflects change in the acquisition strategy to a Middle-Tier Acquisition rapid-prototyping program with acceleration of demonstration and analysis into FY20 with follow-on operational system integration and testing in FY21.

Management Services (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Management Services	C/CPAF	Not specified. : TBD	0.000	-		-		-		-		-	-	-	-
Program Management Administration	Various	AFLCMC/HBDD : Hanscom AFB, MA	0.000	4.642	Oct 2019	4.567	Oct 2020	-		-		-	-	-	-
Subtotal			0.000	4.642		4.567		-		-		-	-	-	N/A

Project Cost Totals	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
	0.000	22.469	19.321	-	-	-	-	-	N/A

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0207455F / <i>Three Dimensional Long-Range Radar (3DELRR)</i>	Project (Number/Name) 646002 / <i>Three Dimensional Expeditionary Long Range Radar</i>

FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

<i>Three Dimensional Expeditionary Long Range Radar</i>	
Operational Assessment Demonstration Planning	████████
Prototype Other Transaction Authority Contract Award	████████
Operational Assessment Demonstration	████████
Command & Control Integration	████████
Operational Test Planning	████████
Operational / Integration Test	████████

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Exhibit R-4A, RDT&E Schedule Details: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0207455F / <i>Three Dimensional Long-Range Radar (3DELRR)</i>	Project (Number/Name) 646002 / <i>Three Dimensional Expeditionary Long Range Radar</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>Three Dimensional Expeditionary Long Range Radar</i>				
Operational Assessment Demonstration Planning	2	2020	3	2020
Prototype Other Transaction Authority Contract Award	2	2020	3	2020
Operational Assessment Demonstration	3	2020	4	2020
Command & Control Integration	2	2021	4	2021
Operational Test Planning	1	2021	2	2021
Operational / Integration Test	4	2021	1	2022

Note

Schedule is restricted to the current, approved funding profile and allows for completion of rapid prototyping, test and integration efforts that will lead to a production contract decision. Planned events provide necessary data to inform FY22 budget request.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 0207522F / <i>Airbase Air Defense Systems (ABADS)</i>
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COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
Total Program Element	-	0.000	8.721	10.905	0.000	10.905	-	-	-	-	-	-
640410: <i>Tech Maturation & Risk Reduct</i>	-	0.000	8.721	10.905	0.000	10.905	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-	-	-

Note
C-sUAS development efforts transitioned to ABADS in FY 2021. Prior to that time, C-sUAS efforts were funded in PE 0604287F. ABADS is not a new start effort.

A. Mission Description and Budget Item Justification

Airbase Air Defense Systems (ABADS)
The Air Force Airbase Air Defense Systems (ABADS) program is the principal USAF program to defend against airborne threats to USAF bases, to include but not limited to, small-unmanned aircraft systems (sUAS), rockets, artillery, and mortars (RAM), and other airborne threats. This program protects strategic assets vital to national security while bedded down and while on the move. It also protects personnel and assets whether CONUS or deployed in theater. Airborne threats are increasingly inexpensive, readily available and have been used to target US Service members, Allies and Coalition partners. These threats will evolve continuously as enemy employment adapts and commercially available technology advances are more readily available. The ABADS program will continue to analyze evolving threats and evaluating new capabilities to take on these threats, while also designing an architecture and new systems to bring down life cycle cost to allow fielding of that capability to all 180+AF installations and protect AF assets globally.

ABADS FY2022 funding will further develop Command, Control, Communication, Computers, and Intelligence (C4I) systems. This development will include, but not limited to: artificial intelligence development for operator task automation, closed-loop training system for operator certification and proficiency, track fusion updates, Link 16 capability integration, Advanced Battle Management System (ABMS) inclusion, Universal Command & Control (UC2) implementation, Joint All-Domain Command & Control (JADC2) development, standardize application data models, design physical on premise network for cloud implementation, and Electronic Warfare upgrades, to include but not limited to Ninja capability within Medusa C2.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver Air Base Air Defense Sytem capabilities for emergent or unanticipated weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program element 0605831F. In FY19 0.00M and in FY20 0.00M was expended for civilian pay expenses in this program element. In FY21 0.00M is forecasted for civilian pay expenses in this program element.

This requirement supports performance of a full financial audit as required by title 10 U.S.C. Chapter 9A, Sec 240-D "Audits: audit of financial statements of Department of Defense components by independent external auditors

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force	Date: May 2021
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Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 0207522F / <i>Airbase Air Defense Systems (ABADS)</i>
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This effort is in Budget Activity 4, Advanced Component Development and Prototypes (ACD&P), because efforts are necessary to evaluate integrated technologies, representative modes or prototype systems in a high fidelity and realistic operating environment.

B. Program Change Summary (\$ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Previous President's Budget	0.000	8.737	26.575	0.000	26.575
Current President's Budget	0.000	8.721	10.905	0.000	10.905
Total Adjustments	0.000	-0.016	-15.670	0.000	-15.670
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	0.000	0.000			
• Other Adjustments	0.000	-0.016	-15.670	0.000	-15.670

Change Summary Explanation

Effort realigned from PE 0604287F in the FY2021 budget.

C. Accomplishments/Planned Programs (\$ in Millions)	FY 2020	FY 2021	FY 2022
Title: Airbase Air Defense Systems (ABADS)	0.000	8.721	10.905
Description: Airbase Air Defense Systems (ABADS) The Air Force Airbase Air Defense Systems (ABADS) program will continue to defend against the emerging and growing airborne threats. This program protects strategic assets vital to national security while bedded down and while on the move. This program will continue to adapt quickly to keep pace with enemy employment tactics, commercially available technology and advancements in emerging threats.			
FY 2021 Plans:			
- Developing Command, Control, Communication, Computers, and Intelligence (C4I), to include but not limited to artificial intelligence development for operator task automation, closed-loop training system for operator certification and proficiency, track fusion updates, Link 16 capability integration, Advanced Battle Management System (ABMS) inclusion, Universal Command & Control (UC2) implementation, Joint All-Domain Command & Control (JADC2) development, standardize application data models, design physical on premise network for cloud implementation.			
- Developing Electronic Warfare upgrades, to include but not limited to new Ninja skills from new external agencies for the DoD, and leverage full Ninja capability within Medusa C2.			

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 0207522F / <i>Airbase Air Defense Systems (ABADS)</i>
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C. Accomplishments/Planned Programs (\$ in Millions)	FY 2020	FY 2021	FY 2022
<ul style="list-style-type: none"> - Developing Urgent Need System Upgrades, to include but not limited to false alarm reduction, increase line of bearing accuracy and finalize integration of all components. - Developing advanced sensors and effectors to counter enemy airborne threats. - Developing Digital Engineering and Integration capabilities to include but not limited to, modeling and simulation capability, test range support, system integration labs and contractor support <p>FY 2022 Plans:</p> <ul style="list-style-type: none"> - Will continue further development Command, Control, Communication, Computers, and Intelligence (C4I), to include but not limited to artificial intelligence development for operator task automation, closed-loop training system for operator certification and proficiency, track fusion updates, Link 16 capability integration, Advanced Battle Management System (ABMS) inclusion, Universal Command & Control (UC2) implementation, Joint All-Domain Command & Control (JADC2) development, standardize application data models, design network for cloud implementation. - Will continue further development Electronic Warfare upgrades, to include but not limited to new Ninja skills from new external agencies for the DoD, and leverage full Ninja capability within Medusa C2. - Will continue further development of Urgent Need System Upgrades, and finalize integration of all components. - Will continue to develop advanced sensors and effectors to counter enemy airborne threats. - Will continue to develop Digital Engineering and Integration capabilities to include but not limited to, modeling and simulation capability, test range support, system integration labs and contractor support -Will continue Command and Control (C2) modernization and enhancements. <p>FY 2021 to FY 2022 Increase/Decrease Statement: The final deliveries of C-sUAS urgent need capabilities are wrapping up in early FY21. Multiple Combatant Commanders have identified capability gaps in the delivered equipment and further refined their C-sUAS operational requirements based upon the lessons learned with the current equipment. The increase in RDT&E investment will start filling these gaps and fulfilling the new requirements for C-sUAS.</p>			
Accomplishments/Planned Programs Subtotals	0.000	8.721	10.905

D. Other Program Funding Summary (\$ in Millions)											
<u>Line Item</u>	<u>FY 2020</u>	<u>FY 2021</u>	<u>FY 2022</u>	<u>FY 2022</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>FY 2026</u>	<u>Cost To</u>	<u>Total Cost</u>
			<u>Base</u>	<u>OCO</u>	<u>Total</u>					<u>Complete</u>	
• OPAF 03 0207522F: <i>Airbase Air Defense Systems (ABADS)</i>	0.000	9.108	27.186	-	27.186	-	-	-	-	-	-

Remarks

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force Date: May 2021

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 0207522F / <i>Airbase Air Defense Systems (ABADS)</i>
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E. Acquisition Strategy

Implement a "Government-as-the-Integrator" approach by procuring integration services independent of systems being developed through existing integration service contracts within the DoD. The services will establish processes and support tools to enable integration of planned projects. Example integration services include, but are not limited to, establishing a continuous integration/continuous deployment (CI/CD) software pipeline, implementing Agile DevSecOps processes and deploying model-based design. Leverage small business innovative research opportunities to generate new code to produce capabilities for detection and defeat of airborne threats. Leverage urgent need support contracts to develop innovative and incremental changes to systems fielded for C-sUAS and urgent operational needs, and expanding to other airborne threats. Accomplish system verification-fix-verification loops earlier in the lifecycle for planned projects by leveraging independent integration services from systems being developed. Integration services will be acquired from existing integration service contracts within the DoD.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0207522F / Airbase Air Defense System (ABADS)	Project (Number/Name) 640410 / Tech Maturation & Risk Reduct s (ABADS)
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Product Development (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
C-sUAS Joint Serv System Development	Various	Not specified. : TBD	-	-		-		1.704	Jan 2022	-		1.704	-	-	-
C-sUAS New Platform Development	Various	Not specified. : TBD	-	-		-		0.500	Dec 2021	-		0.500	-	-	-
C-sUAS Software Development	Various	Not specified. : TBD	-	0.000		6.984	Jan 2021	3.200	Nov 2021	-		3.200	-	-	-
Subtotal			-	0.000		6.984		5.404		-		5.404	-	-	N/A

Test and Evaluation (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
C-sUAS Test	Various	Not specified. : TBD	-	0.000		1.737	Jan 2021	1.100	Jan 2022	-		1.100	-	-	-
Subtotal			-	0.000		1.737		1.100		-		1.100	-	-	N/A

Management Services (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
C-sUAS Systems Engineer	C/Various	Various : Hanscom, MA	-	-		-		4.201	Mar 2022	-		4.201	-	-	-
C-sUAS Program Management Administration	C/Various	Various : Hanscom, MA	-	-		-		0.200	Jul 2022	-		0.200	-	-	-
Subtotal			-	-		-		4.401		-		4.401	-	-	N/A

			Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals			-	0.000	8.721	10.905	-	10.905	-	-	N/A

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0207522F / Airbase Air Defense System (ABADS)	Project (Number/Name) 640410 / Tech Maturation & Risk Reductions

FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

C-sUAS Events	
C-sUAS Joint Service Lead System Development	
C-sUAS Software Development	
C-sUAS Test	
C-sUAS New Platform Development	
C-sUAS Systems Engineering	

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Exhibit R-4A, RDT&E Schedule Details: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0207522F / Airbase Air Defense System (ABADS)	Project (Number/Name) 640410 / Tech Maturation & Risk Reduct s (ABADS)

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
C-sUAS Events				
C-sUAS Joint Service Lead System Development	2	2022	4	2026
C-sUAS Software Development	1	2021	4	2026
C-sUAS Test	1	2021	4	2026
C-sUAS New Platform Development	2	2022	4	2026
C-sUAS Systems Engineering	2	2021	4	2026

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 0208030F / <i>War Reserve Materiel - Ammunition</i>
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COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
Total Program Element	-	0.000	0.000	3.943	0.000	3.943	-	-	-	-	-	-
648030: <i>Operational Weaponing and Analysis</i>	-	0.000	0.000	3.943	0.000	3.943	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-	-	-

Note

This program, BA 4, PE 0208030F, project 648030, Operational Weaponing and Analysis, is a new start.

The AF will assume operational support and development of the Integrated Munitions Effects Assessment (IMEA) software program from the Defense Threat Reduction Agency starting FY22.

A. Mission Description and Budget Item Justification

The Operational Weaponing and Analysis (OWA) provides weapons' effectiveness data and classified software Modeling and Simulation (M&S) tools to support the Air Force (AF) Requirements Process, Combatant Commands (COCOMs), and Major Commands (MAJCOMS). OWA provides mission critical National Security Software (NSS) to meet instructions and directives found in CJCSI 3160 and 3170, as well as, AFI 14-401 and JP 3-60. M&S classified software tools are operationally critical to overall mission success and weapons employment. Weapons employment is not legally possible until a complete target and weapon analysis is complete. The classified M&S software tools are in constant development to support evolving weapon phenomenology (directed energy, high power microwave, cyber, hypersonic, etc.) and target modeling of a wide range of multi-domain targets, which includes structural, ground mobile, ships, and more.

The Integrated Munitions Effects Analysis (IMEA) software is a classified mission critical program that provides Air Force Operational Warfighters with unique analytical capabilities. These unique capabilities are associated with Hard Deeply Buried Targets (HDBTs), Nuclear Weapons, and Weapons of Mass Destruction (WMD) weapons employment. In addition, IMEA also analyzes national strategic sites facility defeat information with Nuclear and WMD weapons in support of operational warfighter requirement. IMEA is also the only software, which is program of record for Massive Ordnance Penetrator (MOP) lethality estimates in DoD.

In addition to operational support, IMEA provides analytical reachback for both operational and weapon acquisition communities. OWA also aligns with Air Force Research Laboratory (AFRL) and Defense Threat Agency (DTRA) Research and Development (R&D) weapon lethality and effectiveness missions to create an R&D pipeline of capabilities all maintained in a single M&S software framework which allows the software to be easily developed, deployed, and maintained within the Operational Weaponing and Analysis Division.

The AF will assume operational support and development of the IMEA program from the Defense Threat Reduction Agency starting FY22. DTRA will continue to support Air Force with basic R&D research of new capabilities associated with HDBT, Nuclear, and WMD as defined by MOA between DTRA and the AF. OWA has become the operational transition partner for DTRA and AFRL to integrate and field all weapon and target R&D technology to AF and other Joint Environments.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force	Date: May 2021
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Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 0208030F / <i>War Reserve Materiel - Ammunition</i>
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This program element may include necessary emergent or unanticipated civilian pay expenses required to manage, execute, and deliver War Reserve Materiel - Ammunition weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in Program Elements 0605831F.

This effort is in Budget Activity 4, Advanced Component Development and Prototypes (ACD&P), because efforts are necessary to evaluate integrated technologies, representative modes or prototype systems in a high fidelity and realistic operating environment.

B. Program Change Summary (\$ in Millions)	<u>FY 2020</u>	<u>FY 2021</u>	<u>FY 2022 Base</u>	<u>FY 2022 OCO</u>	<u>FY 2022 Total</u>
Previous President's Budget	0.000	0.000	0.000	0.000	0.000
Current President's Budget	0.000	0.000	3.943	0.000	3.943
Total Adjustments	0.000	0.000	3.943	0.000	3.943
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	0.000	0.000			
• Other Adjustments	0.000	0.000	3.943	0.000	3.943

Change Summary Explanation

FY22 - The requested \$3.943M will establish AF air-to-surface kinetic / conventional R&D support for IMEA. The AF will be transitioning the IMEA software framework / architecture to the AF Endgame Framework to support Joint operations. This transition will focus on evolving weapon phenomenology associated with advanced penetrator and hypersonic weapons against Hard Deeply Buried Targets (HDBTs). The AF will assume operational support and development of the IMEA software from the Defense Threat Reduction Agency starting FY22. DTRA will continue to support Air Force with basic R&D research of new capabilities associated with HDBT, Nuclear, and WMD as defined by MOA between DTRA and the AF. The AF is the operational fielding and transition partner for DTRA and AFRL to integrate and field all weapon and target R&D technology to AF and other Joint Environments.

C. Accomplishments/Planned Programs (\$ in Millions)	<u>FY 2020</u>	<u>FY 2021</u>	<u>FY 2022 Base</u>	<u>FY 2022 OCO</u>	<u>FY 2022 Total</u>
Title: Operational Weaponeeing and Analysis	0.000	0.000	3.943	0.000	3.943
Description: The Operational Weaponeeing and Analysis (OWA) provides weapons' effectiveness data and classified software Modeling and Simulation (M&S) tools to support the Air Force (AF) Requirements Process, Combatant Commands (COCOMs), and Major Commands (MAJCOMS).					
FY 2021 Plans:					

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force	Date: May 2021
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Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 0208030F / <i>War Reserve Materiel - Ammunition</i>
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C. Accomplishments/Planned Programs (\$ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
<p>N/A</p> <p>FY 2022 Base Plans: Conduct Operational Users Working Group (OUWG) reviews, providing a singularly unique forum for AF and Joint service level demonstrations of developmental methodologies and data to support weapon and target effectiveness. Collect, assess and inject operational user and analyst end user feedback into product development cycles.</p> <p>Exploit Agile Continuous Integration and Continuous Development (CI/CD) pipeline to provide Technical Previews (TPs) of evolving phenomenology models and operational capabilities.</p> <p>Develop common target and weapon data models to support multi-domain capabilities within a common AF and Joint M&S lethality framework. All weapon data, target data and methodology will be hosted in a the Air Force Combined Effects Repository (AFCER). The repository will be hosted on the AF WeaponOne (W1) Digital Engineering P1 environment.</p> <p>Refactor IMEA weapon and target data and methodologies into a common engagement lethality architecture to enable CI/CD pipeline.</p> <p>Develop, validate, and accredit improved computer vulnerability and weapons effectiveness in support of warfighter requirements. Integrate Verification, Validation and Accreditation (VV&A) and Independent Verification and Validation (IV&V) efforts into Agile product development processes.</p> <p>FY 2022 OCO Plans: N/A</p> <p>FY 2021 to FY 2022 Increase/Decrease Statement: New program for the AF: AF will take over operational support of the IMEA program from the Defense Threat Reduction Agency (DTRA) in FY22.</p>					
Accomplishments/Planned Programs Subtotals	0.000	0.000	3.943	0.000	3.943

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 0208030F / <i>War Reserve Materiel - Ammunition</i>
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D. Other Program Funding Summary (\$ in Millions)

<u>Line Item</u>	<u>FY 2020</u>	<u>FY 2021</u>	<u>FY 2022</u> <u>Base</u>	<u>FY 2022</u> <u>OCO</u>	<u>FY 2022</u> <u>Total</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>FY 2026</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• PAAF 01 355990: <i>Items Less Than \$5</i>	-	-	9.164	-	9.164	-	-	-	-	-	-

Remarks

E. Acquisition Strategy

Performance-based contracts are primarily used for this support. IMEA and AFTES will maximize the use of competitive awards and uses various contract types, employs large and small contractors, and is focused to achieve agency socio-economic goals and incorporate DoD acquisition reform initiatives.

Both AFTES and IMEA are paralleling AF Digital Engineering contracting effort to add Agile capabilities into performance contracts. IMEA and AFTES use physics based modeling requiring specialized methodology development unique to specific weapon capabilities. The Operational and Analysis (OWA) has identified multiple sources of software development include both commercial and defense working capital.

OWA identified multiple contacts to support software development efforts including five year IDIQs awarded by Army Contracting Command (ACC), General Services Administration (GSA), and Air Force. We are working to award additional GSA contracts to support software development in the for outyear development.

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Exhibit R-4, RDT&E Schedule Profile: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0208030F / <i>War Reserve Materiel - Ammunition</i>	Project (Number/Name) 648030 / <i>Operational Weaponneering and Analysis</i>

	FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

<i>Integrated Munitions Effects Assessment (IMEA)</i>																												
Integrated Munitions Effects Assessment (IMEA)																												
<i>Air Force Targeting and Effects Software (AFTES)</i>																												
Air Force Targeting and Effects Software (AFTES)																												

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Exhibit R-4A, RDT&E Schedule Details: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0208030F / <i>War Reserve Materiel - Ammunition</i>	Project (Number/Name) 648030 / <i>Operational Weaponeering and Analysis</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>Integrated Munitions Effects Assessment (IMEA)</i>				
Integrated Munitions Effects Assessment (IMEA)	1	2022	4	2026
<i>Air Force Targeting and Effects Software (AFTES)</i>				
Air Force Targeting and Effects Software (AFTES)	1	2022	4	2026

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 0208099F I <i>Unified Platform (UP)</i>
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COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
Total Program Element	-	9.634	5.979	0.000	0.000	0.000	-	-	-	-	-	-
646504: <i>AF Prototyping</i>	-	5.000	2.984	0.000	0.000	0.000	-	-	-	-	-	-
646505: <i>USCYBERCOM Prototyping</i>	-	4.634	2.995	0.000	0.000	0.000	-	-	-	-	-	-

Note

In FY 2021, Project 646504, AF Prototyping completed.

In FY 2021, Project 646505, USCYBERCOM Prototyping completed.

A. Mission Description and Budget Item Justification

Unified Platform provides the Cyber Mission Forces, U.S. Cyber Command (USCYBERCOM), AF Major Commands (MAJCOM), and Service cyber components a Joint cyber operations infrastructure enabling full spectrum cyberspace operations at the operational through tactical levels of warfare. The DoD, AF, and the Cyber Mission Force require an interconnected and interoperable cyber infrastructure to conduct integrated planning and execution of cyberspace operations. Unified Platform delivers this capability through the integration of disparate, Service-specific platforms and systems, infrastructure, mission capabilities, data analytics, and programs to build interoperable and scalable network for cyber capabilities. A common, Unified Platform allows the DoD to achieve and maintain decision and operational superiority, the key to successful cyber operations within the highly dynamic cyberspace domain.

Unified Platform rapid prototyping efforts integrate Service-specific cyber capabilities and explore novel cyber technologies culminating in an initial Unified Platform capability (e.g. minimum viable product). The rapidly evolving cyberspace domain requires flexibility in which rapid prototyping activities inform the initial Unified Platform capability baseline through the early stages of technology maturation and delivery. Rapid prototyping efforts are executed in an operational development environment to expedite development and evaluation of cyber capabilities within relevant warfighter timelines and are transitioned to Foundational Efforts (BA 7, PE 0208099F Unified Platform, 672281 Foundational Efforts) once included in the Unified Platform baseline.

The Secretary of the Air Force leads the Unified Platform effort as Executive Agent on behalf of the Department of Defense. Unified Platform directly supports the Joint Network Attack Initial Capabilities Document (ICD), the National Military Strategy for Cyberspace Operations (NMS-CO), USCYBERCOM operational directives, the latest MAJCOM Offensive Cyberspace Operations System Flight Plan, and other formal requirements documents.

Prototyping effort ends in FY21.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver weapon system capability. The use of such programs funds would be in addition to the civilian pay expenses budgeted in program element 0605831F. In FY20 0.000M was expended for civilian pay expenses in this program element, and in FY21 0.000M is forecasted for civilian pay expenses in this program element.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force	Date: May 2021
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Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 0208099F / <i>Unified Platform (UP)</i>
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This effort is in Budget Activity 4, Advanced Component Development and Prototypes (ACD&P), because efforts are necessary to evaluate integrated technologies, representative modes or prototype systems in a high fidelity and realistic operating environment.

B. Program Change Summary (\$ in Millions)	<u>FY 2020</u>	<u>FY 2021</u>	<u>FY 2022 Base</u>	<u>FY 2022 OCO</u>	<u>FY 2022 Total</u>
Previous President's Budget	10.000	5.990	0.000	0.000	0.000
Current President's Budget	9.634	5.979	0.000	0.000	0.000
Total Adjustments	-0.366	-0.011	0.000	0.000	0.000
• Congressional General Reductions	0.000	-0.011			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	-0.366	0.000			
• Other Adjustments	0.000	0.000	0.000	0.000	0.000

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 4					R-1 Program Element (Number/Name) PE 0208099F / Unified Platform (UP)				Project (Number/Name) 646504 / AF Prototyping			
COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
646504: AF Prototyping	-	5.000	2.984	0.000	0.000	0.000	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The rapidly evolving cyberspace domain demands highly flexible requirements, acquisition activities, and operations to respond to emerging opportunities or mitigate adversary actions. Salient to this mission area, rapid prototyping activities provide the structure to rapidly develop, evaluate, and integrate new cyber capabilities and inform the initial Unified Platform capability baseline during the early stages of technology maturation and delivery. Air Force Prototyping efforts support this need through rapid and exploratory research, prototype development, risk reduction, testing, and integration of cyber capabilities contributing to early operational development of the Unified Platform capability baseline. The USAF in conjunction with the Services and National Agencies execute operationally focused research and development and rapid prototyping to explore and determine validity of potential infrastructure, architectures, and capabilities/tools to support Cyber Mission Forces. These rapid prototyping efforts are tailored for near-immediate integration into the Unified Platform baseline (BA 7, PE 0208099F Unified Platform, BPAC 672281 Foundational Efforts) for delivery to cyber warfighters.

Prototyping effort ends in FY21.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver weapon system capability. The use of such programs funds would be in addition to the civilian pay expenses budgeted in program element 0605831F. In FY20 0.000M was expended for civilian pay expenses in this program element, and in FY21 0.000M is forecasted for civilian pay expenses in this program element.

B. Accomplishments/Planned Programs (\$ in Millions)

	FY 2020	FY 2021	FY 2022
Title: AF Prototyping	5.000	2.984	-
Description: AF prototyping efforts will initially develop the UP Minimum Viable Product (MVP) baseline from existing "best of breed" systems, completed prototyping efforts, existing Service-developed solutions, joint user-input, and other sources			
FY 2021 Plans:			
- Continue to develop incremental operational capability addressing highest priority user requirements.			
- Some aspects of the effort are classified and will be provided on a need-to-know basis.			
FY 2021 to FY 2022 Increase/Decrease Statement: Funding decreased due to project completion in FY21.			
Accomplishments/Planned Programs Subtotals	5.000	2.984	-

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0208099F / <i>Unified Platform (UP)</i>	Project (Number/Name) 646504 / <i>AF Prototyping</i>
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C. Other Program Funding Summary (\$ in Millions)

Line Item	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
• RDTE 07 0208099F: <i>Unified Platform (UP)</i>	90.002	84.491	101.893	-	101.893	-	-	-	-	-	-
• OPAF 03 835080: <i>AFNET</i>	4.963	-	-	-	-	-	-	-	-	-	-
• OPAF 03 834320: <i>C3 Countermeasures</i>	-	4.956	4.904	-	4.904	-	-	-	-	-	-

Remarks

Beginning in FY21 associated OPAF realigned from AFNET WSC to C3 Countermeasures WSC for clarity in reporting.

D. Acquisition Strategy

Unified Platform represents a flexible, interoperable, and scalable warfighter capability to be employed by the Army, Navy, Marine Corps, and Air Force in conjunction with U.S. Cyber Command (USCYBERCOM). In order to match the speed of need of the highly dynamic cyberspace domain, the Service-agnostic Unified Platform capability implements an agile development framework to facilitate the rapid development, integration, and fielding of capabilities to remain responsive to evolving warfighter requirements. The Unified Platform program executes the agile development requirements provided by the Army, Navy, Marine Corps, Air Force, and USCYBERCOM stakeholders in accordance with the prioritization provided by the multi-Service Unified Platform governance structure.

The initial Unified Platform capability delivers a minimum viable product (MVP) for immediate deployment and operational use by the Cyber Mission Force. Subsequent build iterations continue to deliver enhanced capabilities, incrementally building the Unified Platform capability to match warfighter needs and requirements to achieve cyberspace dominance. Early development of the Unified Platform baseline capability relies on extensive rapid prototyping efforts to analyze integration constraints and opportunities of Service-specific cyber capabilities to realize the Unified Platform MVP and inform the future Unified Platform baseline (BA 4, PE 0208099F Unified Platform, 646504 AF Prototyping and 646505 USCYBERCOM Prototyping). In parallel, an enduring foundational Unified Platform thrust area supports the development and maturation of Unified Platform baseline, integrates successful prototyping activities, and implements an agile development/security/operations (DevSecOps) construct to rapidly evolve and enhance the Unified Platform capability to match warfighter requirements (BA 7, PE 0208099F Unified Platform, 672281 Foundational Efforts).

The Unified Platform program office utilizes Concept, Development, Risk management, Production, or Deployment Plans as part of a streamlined approach to agile acquisition planning. All plans contain sufficient information to inform acquisition decisions (i.e., authorities to proceed), within the agile framework, to determine readiness to enter into the applicable phase of the acquisition process. Unified Platform utilizes both new and existing contractual vehicles, such as Government-Wide Acquisition Contract (GWAC) vehicles (Alliant, Encore II, Solutions for Enterprise-Wide Procurement IV (SEWP IV), and General Services Administration (GSA) Federal Supply Schedules and a new Cyber Indefinite Delivery Indefinite Quantity (IDIQ) contract. The use of multiple-award contractual vehicles will provide a wide range of commercially-available products and services that can meet many requirements related to Unified Platform. These multiple-award contractual vehicles have already met the statutory requirements of the Competition in Contracting Act (CICA); they require a fair opportunity to all contract holders, in accordance with Federal Acquisition Regulation (FAR) 16.505, unless an exception to fair opportunity applies.

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0208099F / <i>Unified Platform (UP)</i>	Project (Number/Name) 646504 / <i>AF Prototyping</i>
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Prototyping effort ends in FY21.

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Exhibit R-4, RDT&E Schedule Profile: PB 2022 Air Force **Date: May 2021**

Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0208099F / <i>Unified Platform (UP)</i>	Project (Number/Name) 646504 / <i>AF Prototyping</i>
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FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

<i>AF Prototyping</i>	
Agile Capability Prototyping	[REDACTED]

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Exhibit R-4A, RDT&E Schedule Details: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0208099F / <i>Unified Platform (UP)</i>	Project (Number/Name) 646504 / <i>AF Prototyping</i>
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Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>AF Prototyping</i>				
Agile Capability Prototyping	1	2020	4	2021

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 4					R-1 Program Element (Number/Name) PE 0208099F / Unified Platform (UP)				Project (Number/Name) 646505 / USCYBERCOM Prototyping			
COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
646505: USCYBERCOM Prototyping	-	4.634	2.995	0.000	0.000	0.000	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

In FY 2021, Project 646504, AF Prototyping completed.

In FY 2021, Project 646505, USCYBERCOM Prototyping completed.

A. Mission Description and Budget Item Justification

U.S. Cyber Command's (USCYBERCOM) mission is to deter or defeat strategic cyber threats to US interests and infrastructure, provide mission assurance for the operations and defense of the Department of Defense information environment, and support the achievement of Combatant Commander and Joint Force Commander Objectives.

The rapidly evolving cyberspace domain demands highly flexible requirements, acquisition activities, and operations to respond to emerging opportunities or mitigate adversary actions. Salient to this mission area, rapid prototyping activities provide the structure to rapidly develop, evaluate, and integrate new cyber capabilities and inform the initial Unified Platform capability baseline during the early stages of technology maturation and delivery. USCYBERCOM Prototyping efforts support this need through the focus on the rapid and exploratory research, prototype development, risk reduction, testing, and integration of cyber capabilities contributing to early operational development of the Unified Platform capability baseline. USCYBERCOM in conjunction with the Services and National Agencies execute operationally focused research and development and rapid prototyping to explore and determine validity of potential infrastructure, architectures, and capabilities/tools to support Cyber Mission Forces. These rapid prototyping efforts are tailored for near-immediate integration into the Unified Platform baseline (BA 7, PE 0208099F Unified Platform, BPAC 672281F Foundational Efforts) for delivery to cyber warfighters.

Prototyping effort ends in FY21.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver Unified Platform weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program element 0605831F

B. Accomplishments/Planned Programs (\$ in Millions)

	FY 2020	FY 2021	FY 2022
Title: USCYBERCOM Prototyping	4.634	2.995	-
Description: Funding supports USCYBERCOM prototyping efforts associated with the research, development, and integration of cyber technologies supporting the Unified Platform program.			
FY 2021 Plans:			

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0208099F / <i>Unified Platform (UP)</i>	Project (Number/Name) 646505 / <i>USCYBERCOM Prototyping</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2020	FY 2021	FY 2022
- Continue to conduct prototyping efforts in support of Unified Platform program.			
- The origin, details, and specific aspects of these efforts are classified and will be provided on a need-to-know basis.			
<i>FY 2021 to FY 2022 Increase/Decrease Statement:</i> Funding decreased due to project completion in FY21			
Accomplishments/Planned Programs Subtotals	4.634	2.995	-

C. Other Program Funding Summary (\$ in Millions)											
Line Item	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
• RDTE 07 0208099F: <i>Unified Platform (UP)</i>	90.002	84.491	101.893	-	101.893	-	-	-	-	-	-
• OPAF 03 835080: <i>AFNET</i>	4.963	0.000	0.000	-	0.000	-	-	-	-	-	-
• OPAF 03 834320: <i>C3 Countermeasures</i>	0.000	4.956	4.904	-	4.904	-	-	-	-	-	-

Remarks
Beginning in FY21 associated OPAF realigned from AFNET WSC to C3 Countermeasures WSC for clarity in reporting.

D. Acquisition Strategy
Unified Platform represents a flexible, interoperable, and scalable warfighter capability to be employed by the Army, Navy, Marine Corps, and Air Force in conjunction with U.S. Cyber Command (USCYBERCOM). In order to match the speed of need of the highly dynamic cyberspace domain, the Service-agnostic Unified Platform capability implements an industry standard agile framework to facilitate the rapid development, integration, and fielding of capabilities to remain responsive to evolving warfighter requirements. The Unified Platform program executes the agile development requirements provided by the Army, Navy, Marine Corps, Air Force, and USCYBERCOM stakeholders in accordance with the prioritization provided by the multi-Service Unified Platform governance structure.

The initial Unified Platform capability delivers a minimum viable product (MVP) for immediate deployment and operational use by the Cyber Mission Force. Subsequent build iterations continue to deliver enhanced capabilities, incrementally building the Unified Platform capability to match warfighter needs and requirements to achieve cyberspace dominance. Early development of the Unified Platform baseline capability relies on extensive rapid prototyping efforts to analyze integration constraints and opportunities of Service-specific cyber capabilities to realize the Unified Platform MVP and inform the future Unified Platform baseline (BA 4, PE 0208099F Unified Platform, 646504 AF Prototyping and 646505 USCYBERCOM Prototyping). In parallel, an enduring foundational Unified Platform thrust area supports the development and maturation of Unified Platform baseline, integrates successful prototyping activities, and implements an agile development/security/operations (DevSecOps) construct to rapidly evolve and enhance the Unified Platform capability to match warfighter requirements (BA 7, PE 0208099F Unified Platform, 672281 Foundational Efforts).

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity	R-1 Program Element (Number/Name)	Project (Number/Name)
3600 / 4	PE 0208099F / <i>Unified Platform (UP)</i>	646505 / <i>USCYBERCOM Prototyping</i>

The Unified Platform program office utilizes Concept, Development, Risk management, Production, or Deployment Plans as part of a streamlined approach to agile acquisition planning. All plans contain sufficient information to inform acquisition decisions (i.e., authorities to proceed), within the agile framework, to determine readiness to enter into the applicable phase of the acquisition process. Unified Platform utilizes both new and existing contractual vehicles, such as Government-Wide Acquisition Contract (GWAC) vehicles (Alliant, Encore II, Solutions for Enterprise-Wide Procurement IV (SEWP IV), and General Services Administration (GSA) Federal Supply Schedules and a new Cyber Indefinite Delivery Indefinite Quantity (IDIQ) contract. The use of multiple-award contractual vehicles will provide a wide range of commercially-available products and services that can meet many requirements related to Unified Platform. These multiple-award contractual vehicles have already met the statutory requirements of the Competition in Contracting Act (CICA); they require a fair opportunity to all contract holders, in accordance with Federal Acquisition Regulation (FAR) 16.505, unless an exception to fair opportunity applies.

Prototyping effort ends in FY21.

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Exhibit R-4, RDT&E Schedule Profile: PB 2022 Air Force **Date: May 2021**

Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0208099F / <i>Unified Platform (UP)</i>	Project (Number/Name) 646505 / <i>USCYBERCOM Prototyping</i>
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FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

<i>USCYBERCOM Prototyping</i>	
Agile Capability Prototyping	

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Exhibit R-4A, RDT&E Schedule Details: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0208099F / <i>Unified Platform (UP)</i>	Project (Number/Name) 646505 / <i>USCYBERCOM Prototyping</i>
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Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>USCYBERCOM Prototyping</i>				
Agile Capability Prototyping	1	2020	4	2021

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 0305236F / <i>Common Data Link Executive Agent (CDL EA)</i>
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COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
Total Program Element	-	36.893	39.221	43.881	0.000	43.881	-	-	-	-	-	-
641334: <i>Common Data Link (CDL)</i>	-	36.893	39.221	43.881	0.000	43.881	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-	-	-

A. Mission Description and Budget Item Justification

Common Data Link Executive Agent (CDL EA) provides the DoD standard for interoperable, multi-service, multi-agency, Intelligence, Surveillance, and Reconnaissance (ISR) datalinks for 15,000 DoD manned/unmanned airborne and ground terminals. As the DoD CDL EA, the Air Force is responsible for cross-service application of CDL RDT&E Military Intelligence Program (MIP) funds facilitating compliance to DoD mandates. The CDL EA develops, modifies, distributes, and maintains specifications for the CDL waveform family; ensuring design configuration control, commonality, and interoperability among ISR platforms. Additionally, funds support managing resources allocated for development, maturation, and migration of CDL technologies.

CDL EA enables compliance with OSD mandates to effectively utilize spectrum, use approved cryptographic equipment, and provide direct support to current operations. CDL is a vital link in DoD's existing and emerging communication architectures, providing flexibility to accommodate Command and Control (C2) data and myriad types of Signals Intelligence (SIGINT), Geospatial Intelligence (GEOINT), and Full-Motion Video (FMV) data. The CDL specifications permit current and future ISR asset operations worldwide by providing sensor data directly via point-to-point and broadcast to ground sites, airborne platforms, and dismounted users. Also, CDL provides the capability to relay data via air-to-air or compatible satellite links when the asset and ground site are not in line-of-sight.

CDL EA's research and development activities support a broad array of tactical (including tactical data links (TDL) and high capacity backbone (HCB)), operational, and strategic ISR users and include achieving higher data rates, open architecture development, multi-access and multi-node network management, cryptographic modernization, advancements needed to operate in contested environments, terminal and antenna design enhancements, operations in other spectral bands, and improving spectrum efficiency. Further, CDL development improves large area surveillance missions while supporting continuous improvements and implementation of line-of-sight platform and CDL terminal Command and Control (C2), plus increased ISR (C2ISR) capabilities. Activities also include studies and analysis to support current and future requirements documentation, program planning and execution. CDL prototype terminal designs provide for future technology insertion and reduce non-recurring engineering and life-cycle costs to the user.

In addition, the Cryptographic Core Modernization (CCM) thrust enables CDL to develop a miniaturized gigabit rate Communications Security (COMSEC) device capable of managing CDL data. The miniaturized COMSEC device will allow faster throughput while reducing Size, Weight, and Power (SWaP) requirements.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver Common Data Link weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program element 0605829F. In FY20 0.375M was expended for civilian pay expenses in this program element, and in FY21 0.517M is forecasted for civilian pay expenses in this program element.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force	Date: May 2021
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Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 0305236F / <i>Common Data Link Executive Agent (CDL EA)</i>
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This effort is in Budget Activity 4, Advanced Component Development and Prototypes (ACD&P), because efforts are necessary to evaluate integrated technologies, representative modes or prototype systems in a high fidelity and realistic operating environment.

B. Program Change Summary (\$ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Previous President's Budget	36.910	39.293	46.885	0.000	46.885
Current President's Budget	36.893	39.221	43.881	0.000	43.881
Total Adjustments	-0.017	-0.072	-3.004	0.000	-3.004
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	-0.015	-0.040			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	0.000	0.000			
• Other Adjustments	-0.002	-0.032	-3.004	0.000	-3.004

C. Accomplishments/Planned Programs (\$ in Millions)	FY 2020	FY 2021	FY 2022
Title: Common Data Link (CDL) Technology Advancement	15.993	11.303	19.100
Description: CDL evolutionary concept development, exploratory prototyping, advanced technology demonstrations, and studies of emerging technologies and capability gaps.			
FY 2021 Plans:			
<ul style="list-style-type: none"> - Continue development and maturation of new LPI/LPD/AJ waveform capability to support operations in the contested airspace. - Continue to research and evaluate technology developments for enhancing the CDL enterprise networking architecture, to include network management devices, applications and advanced algorithms. - Continue to research, evaluate and develop more spectrally efficient waveforms to support Combatant Command demand for higher bandwidth transmission and improved jam resistant capabilities. - Continue to research, evaluate and develop improvements to CDL waveforms to lower probability of detection and interception to support Combatant Command demand for improved covertness of ground and airborne forces. - Continue development of enhanced, CDL-based Intelligence, Surveillance and Reconnaissance (ISR) communication capabilities across multiple platforms and echelons among U.S and allied partners. - Continue development of a collaborative CDL modeling and simulation environment using Navy Research Lab's Extendable Mobile Ad-Hoc Network Emulator (EMANE) framework for CDL performance analysis and waveform advancements. The CDL 			

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force	Date: May 2021
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Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 0305236F / <i>Common Data Link Executive Agent (CDL EA)</i>
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C. Accomplishments/Planned Programs (\$ in Millions)

	FY 2020	FY 2021	FY 2022
<p>EMANE environment will be the baseline for joint Service and vendor collaboration as the community modernizes CDL for the future fight.</p> <ul style="list-style-type: none"> - Continue waveform performance analysis of current CDL capabilities and future enhancements on their ability to achieve mission success in National Defense Strategy (NDS) derived scenarios to focus future CDL modernization efforts to update the CDL specifications. - Continue evaluation, analysis and study of multi-beam antenna technology to further improve CDL networking and Low Probability of Interception / Low Probability of Detection / Anti-Jam (LPI/LPD/AJ) capabilities. - Continue antenna capabilities modernization with multi-beam and Extremely Wideband Operations (EWO) antenna array research and development. - Continue to research, evaluate and develop an Open Systems Architecture to improve CDL enterprise interoperability and terminal design flexibility. - Continue requirements and design analysis of improving BE-CDL support to smaller Group 1 unmanned air assets. - Continue prototyping efforts and advanced technology demonstrations in support of emerging communication backbone architecture, including high capacity backbone development across multiple domains. - Continue research and evaluation of developing Artificial Intelligence (AI) technologies to support faster correlation and fusion of ISR and CDL network management processes. - Continue to research and evaluate developing technologies to minimize the National Security Agency (NSA) required certification requirements for terminals while standardizing Communications Security (COMSEC) and Transmission Security (TRANSEC) implementation. <p>FY 2022 Plans:</p> <ul style="list-style-type: none"> - Will continue development and maturation of new LPI/LPD/AJ waveform capability to support operations in the contested airspace. - Will continue to research and evaluate technology developments for enhancing the CDL enterprise networking architecture, to include network management devices, applications and advanced algorithms. - Will continue to research, evaluate and develop more spectrally efficient waveforms to support Combatant Command demand for higher bandwidth transmission and improved jam resistant capabilities. - Will continue to research, evaluate and develop improvements to CDL waveforms to lower probability of detection and interception to support Combatant Command demand for improved covertness of ground and airborne forces. - Will continue development of enhanced, CDL-based Intelligence, Surveillance and Reconnaissance (ISR) communication capabilities across multiple platforms and echelons among U.S and allied partners. - Will continue development of a collaborative CDL modeling and simulation environment using Navy Research Lab's Extendable Mobile Ad-Hoc Network Emulator (EMANE) framework for CDL performance analysis and waveform advancements. The CDL 			

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force	Date: May 2021
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Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 0305236F / <i>Common Data Link Executive Agent (CDL EA)</i>
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C. Accomplishments/Planned Programs (\$ in Millions)	FY 2020	FY 2021	FY 2022
<p>EMANE environment will be the baseline for joint Service and vendor collaboration as the community modernizes CDL for the future fight.</p> <ul style="list-style-type: none"> - Will continue waveform performance analysis of current CDL capabilities and future enhancements on their ability to achieve mission success in National Defense Strategy (NDS) derived scenarios to focus future CDL modernization efforts to update the CDL specifications. - Will continue analysis and study of multi-beam antenna technology to further improve CDL networking and Low Probability of Interception / Low Probability of Detection / Anti-Jam (LPI/LPD/AJ) capabilities. - Will continue antenna array modernization with the Extremely Wideband Operations (EWO) antenna array research and development. - Will continue to research, evaluate and develop an Open Systems Architecture to improve CDL enterprise interoperability and terminal design flexibility. - Will continue prototyping and advanced technology demonstrations in support of emerging communication backbone architecture, including high capacity backbone development, across multi-domains. - Will continue requirements and design improvements for more robust BE-CDL support to smaller Group 1 UAV. - Will continue exploratory prototyping efforts and advanced technology demonstrations in support of emerging communication backbone architecture, including HCB development, across air, space and terrestrial layers, to include agile high capacity data transport, assured communications and multi-mode access network. - Will continue research and evaluate developing Artificial Intelligence (AI) technologies to support faster correlation and fusion of ISR and CDL network management processes. - Will continue to research and evaluate developing technologies to minimize the National Security Agency (NSA) required certification requirements for terminals while standardizing Communications Security (COMSEC) and Transmission Security (TRANSEC) implementation. <p>FY 2021 to FY 2022 Increase/Decrease Statement: Increased FY22 investments are projected to allow CDL to support Joint All-Domain Command and Control (JADC2) resilient communications (e.g., improved COMSEC and TRANSEC capabilities) in future contested battlespace environments, resulting in CDL Specification updates released to Service Program Offices in FY23 and FY25.</p>			
<p>Title: Common Data Link (CDL) Specification Development, Validation, Test and Maintenance</p> <p>Description: Systems engineering lifecycle for CDL and NATO STANAG 7085 specification development: requirement decomposition, specification development (modeling, maturation, documentation), specification validation (and associated component prototyping), testing, configuration management, and process maintenance.</p> <p>FY 2021 Plans:</p> <ul style="list-style-type: none"> - Continue development and maturation of new LPI/LPD/AJ waveform capability to support operations in the contested airspace. 	13.800	20.318	15.000

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force	Date: May 2021
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Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 0305236F / <i>Common Data Link Executive Agent (CDL EA)</i>
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C. Accomplishments/Planned Programs (\$ in Millions)	FY 2020	FY 2021	FY 2022
<ul style="list-style-type: none"> - Continue development of vendor and government owner reference implementation of the new LPI/LPD/AJ waveform to performance future validation to ensure the CDL specification is accurate and can be built by multiple vendors in the future, therefore keeping the market space open. - Continue evaluation, analysis and study of network management devices, network and waveform configuration tool development; transition improved technologies into CDL Specification baseline that increases data sharing across Service-specific networks. - Continue validation of Bandwidth Efficient CDL's (BE-CDL) new Direct Sequence Spread Spectrum (DSSS) capability that improves CDL data transmissions rates at lower power levels. - Continue development and advancement of dynamical control algorithms to enable terminals to more efficiently use CDL spectrum. This work also Continue to validate the CDL Common Control Interface. - Continue to work with CDL industry partners and DoD Services and Agencies to document, validate and implement common terminal control interfaces through use of commercially recognized standards. - Continue configuration control of the CDL architecture, standards, specifications and reference artifacts to support open interoperability and open competition. - Continue development of CDL test equipment capable of compliance testing to the latest, validated version of CDL specifications. <p>FY 2022 Plans:</p> <ul style="list-style-type: none"> - Will continue development and maturation of new LPI/LPD/AJ waveform capability to support operations in the contested airspace. - Will continue development of vendor and government owner reference implementation of the new LPI/LPD/AJ waveform to performance future validation to ensure the CDL specification is accurate and can be built by multiple vendors in the future, therefore keeping the market space open. - Will continue evaluation, analysis and study of network management devices, network and waveform configuration tool development; transition improved technologies into CDL Specification baseline that increases data sharing across Service-specific networks. - Will continue validation of Bandwidth Efficient CDL's (BE-CDL) new Direct Sequence Spread Spectrum (DSSS) capability that improves CDL data transmissions rates at lower power levels. - Will continue development and advancement of dynamical control algorithms to enable terminals to more efficiently use CDL spectrum. This work is also to Will continue to validate the CDL Common Control Interface. - Will continue to work with CDL industry partners and DoD Services and Agencies to document, validate and implement common terminal control interfaces through use of commercially recognized standards. - Will continue configuration control of the CDL architecture, standards, specifications and reference artifacts to support open interoperability and open competition. 			

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force		Date: May 2021		
Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>		R-1 Program Element (Number/Name) PE 0305236F / <i>Common Data Link Executive Agent (CDL EA)</i>		
C. Accomplishments/Planned Programs (\$ in Millions)		FY 2020	FY 2021	FY 2022
<p>- Will continue development of CDL test equipment capable of compliance testing to the latest, validated version of CDL specifications.</p> <p>FY 2021 to FY 2022 Increase/Decrease Statement: The decrease in FY22 CDL Specification Development, Validation, Test and Maintenance funding is due to the increased funding allocated to Technology Advancement, which is more heavily funded in even years in preparation for specification publication in odd years. Conversely, Specification Development, Validation, Test and Maintenance is increased in odd years immediately prior to publishing CDL specification release updates to ensure comprehensive validation and testing.</p>				
<p>Title: Common Data Link (CDL) Cryptographic Modernization</p> <p>Description: Phased development effort to modernize CDL Communications Security (COMSEC) and Transmission Security (TRANSEC) devices and standards to maximize performance and reduce Size Weight and Power (SWaP) requirements while supporting interoperability, commonality, modularity, portability, remote management, multi-level security and release to Allied partners.</p> <p>FY 2021 Plans:</p> <ul style="list-style-type: none"> - Continue to research and evaluate developing technologies to minimize the National Security Agency (NSA) required certification requirements for terminals while standardizing COMSEC implementation. - Continue software and firmware upgrades for generation two (Gen 2) Nano and Mini cryptographic core modernization (CCM) modules for US and NATO release. - Continue preparing Engineering Change Proposals (ECP) for Nano and Mini CCM Security Validation Testing (SVT) and subsequent National Security Agency (NSA) information assurance (IA) certification. - Continue to ensure CDL family of waveforms meet developing TRANSEC requirements as outlined by the Office of Secretary of Defense Chief Information Officer (DoD CIO). - Continue development of multi-channel, gigabit data rate (Mega) cryptographic cores with Gen 2 advances. - Continue development and design of common End Cryptographic Units (ECUs) for use with medium- and large-sized ISR terminals. - Continue development of a reference ECU using the Mega CCM crypto core for hardware/software and interface documentation validation. - Continue advancement of standardized CCM interface specifications for modularity to ease future systems upgrades, facilitate competitive terminal procurements, promote innovation, and maintain backward compatibility with existing Intelligence, Surveillance and Reconnaissance (ISR) systems. - Continue development, advancement and instantiation of CCM algorithms to support FIVE EYE (FVEY), North Atlantic Treaty Organization (NATO), and Coalition operations for secure encrypted and interoperable ISR data exchange among allied and partner nations. 		7.100	7.600	9.781

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force	Date: May 2021
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Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 0305236F / <i>Common Data Link Executive Agent (CDL EA)</i>
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C. Accomplishments/Planned Programs (\$ in Millions)	FY 2020	FY 2021	FY 2022
<p>- Continue participating in FVEY, NATO and Coalition forums, testing venues and exercises (including live-fly) to ensure secure encrypted and interoperable ISR data exchange among allied and partner nations.</p> <p>FY 2022 Plans:</p> <ul style="list-style-type: none"> - Will continue to research and evaluate developing technologies to minimize the National Security Agency (NSA) required certification requirements for terminals while standardizing Communications Security (COMSEC) implementation. - Will continue software and firmware upgrades for generation two (Gen 2) Nano and Mini cryptographic core modernization (CCM) modules for US and NATO release. - Will continue preparing Engineering Change Proposals (ECP) for Nano and Mini CCM Security Validation Testing (SVT) and subsequent National Security Agency (NSA) information assurance (IA) certification. - Will continue to ensure CDL family of waveforms meet developing Transmission Security (TRANSEC) requirements as outlined by the Office of Secretary of Defense Chief Information Officer (DoD CIO). - Will continue development of multi-channel, gigabit data rate (Mega) cryptographic cores with Gen 2 advances. - Will continue development and design of common End Cryptographic Units (ECUs) for use with medium- and large-sized ISR terminals. - Will continue development of a reference ECU using the Mega CCM crypto core for hardware/software and interface documentation validation. - Will continue advancement of standardized CCM interface specifications for modularity to ease future systems upgrades, facilitate competitive terminal procurements, promote innovation, and maintain backward compatibility with existing Intelligence, Surveillance and Reconnaissance (ISR) systems. - Will continue development, advancement and instantiation of CCM algorithms to support FIVE EYE (FVEY), North Atlantic Treaty Organization (NATO), and Coalition operations for secure encrypted and interoperable ISR data exchange among allied and partner nations. - Will continue participating in FVEY, NATO and Coalition forums, testing venues and exercises (including live-fly) to ensure secure encrypted and interoperable ISR data exchange among allied and partner nations. <p>FY 2021 to FY 2022 Increase/Decrease Statement: Increased funding will advance COMSEC and TRANSEC protection for more secure data transmission in the future contested operations battlespace, while expanding modern cryptographic protection across the range of collection assets, strategic to tactical.</p>			
Accomplishments/Planned Programs Subtotals	36.893	39.221	43.881

D. Other Program Funding Summary (\$ in Millions) N/A

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force Date: May 2021

Appropriation/Budget Activity 3600: Research, Development, Test & Evaluation, Air Force I BA 4: Advanced Component Development & Prototypes (ACD&P)	R-1 Program Element (Number/Name) PE 0305236F I Common Data Link Executive Agent (CDL EA)
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D. Other Program Funding Summary (\$ in Millions)

Remarks

E. Acquisition Strategy

The Air Force serves as the DoD Common Data Link Executive Agent, with support from each Service's designated CDL lead and AFLCMC/HNA (Airborne Network Division). The CDL EA develops interoperable ISR data links mandated for use by DoD CIO policy. Once CDL technology development matures and a specification is published, services are responsible for CDL compliant platform and terminal procurement; National Security Agency (NSA) and Joint Interoperability Test Command (JITC) ensure compliance certifications; integration; and installation. Acquisition strategy varies by contract. Whenever possible, contracts are awarded under full and open competition.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0305236F / <i>Common Data Link Executive Agent (CDL EA)</i>	Project (Number/Name) 641334 / <i>Common Data Link (CDL)</i>
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Product Development (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Cryptographic Modernization	MIPR	NSA : Ft Meade, MD	-	7.100	Jan 2020	7.600	Jun 2021	9.781	Dec 2021	-		9.781	-	-	-
Generic ECU	C/Various	MIT/LL : TBD	-	1.250	Dec 2019	1.300	Dec 2020	0.000		-		0.000	-	-	-
CDL Network Modernization	MIPR	Air Force : Various	-	3.800	Jan 2020	3.905	Oct 2020	4.804	Oct 2022	-		4.804	-	-	-
Fielded Terminals Database	C/CPFF	Booze Allen : McClean, VA	-	0.700	Jan 2020	0.750	Feb 2021	0.700	Jan 2022	-		0.700	-	-	-
Compliance Test Tool	C/Various	Various : Various	-	1.525	Apr 2020	2.600	Nov 2020	1.698	Nov 2021	-		1.698	-	-	-
A2AD Waveform Advancement	C/CPAF	Army : Various	-	3.800	Apr 2020	4.100	Apr 2021	4.750	Apr 2022	-		4.750	-	-	-
CDL Multi Beam Survey and Demonstration	C/Various	Navy : Various	-	1.200	Dec 2019	1.275	Jun 2021	0.000		-		0.000	-	-	-
BE-CDL SDR	C/Various	AFRL : Various	-	0.200	Dec 2019	0.225	Oct 2020	0.225	Oct 2022	-		0.225	-	-	-
CDL Resource Management and Bridging Network	C/CPAF	Navy : Various	-	1.100	Dec 2019	1.100	Oct 2020	0.000		-		0.000	-	-	-
CDL Performance Analysis	SS/FP	JHU/APL : Various	-	0.400	Dec 2019	1.000	Oct 2020	0.000		-		0.000	-	-	-
CDL Life Cycle Cost Analysis	C/CPAF	Various : Various	-	0.250	Dec 2019	0.250	Dec 2020	0.000		-		0.000	-	-	-
Split SCISR and Group 1 UAV	C/CPAF	Marine Corps : Various	-	-		-		5.228	Dec 2021	-		5.228	-	-	-
Cyber Security Initiative	C/CPAF	Navy : Various	-	-		-		0.650	Dec 2021	-		0.650	-	-	-
Open Systems Architecture Framework	C/CPAF	Navy : Various	-	-		-		1.000	Dec 2021	-		1.000	-	-	-
Antenna Array Modernization	C/CPAF	Various : Various	-	-		-		1.000	Oct 2021	-		1.000	-	-	-
Subtotal			-	21.325		24.105		29.836		-		29.836	-	-	N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Air Force												Date: May 2021			
Appropriation/Budget Activity				R-1 Program Element (Number/Name)					Project (Number/Name)						
3600 / 4				PE 0305236F / Common Data Link Executive Agent (CDL EA)					641334 / Common Data Link (CDL)						
Support (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Service Tech Support & Spec Development	MIPR	Various : Various	-	4.518	Dec 2019	4.194	Dec 2020	3.315	Dec 2021	-		3.315	-	-	-
Joint Staff CDL Requirements Support	MIPR	Joint Staff - J6 : Arlington, VA	-	0.225	Oct 2019	0.225	Oct 2020	0.225	Oct 2021	-		0.225	-	-	-
NATO STANAG 7085 Support	MIPR	Air Force : Various	-	0.225	Oct 2019	0.225	Oct 2020	0.325	Oct 2021	-		0.325	-	-	-
Subtotal			-	4.968		4.644		3.865		-		3.865	-	-	N/A
Test and Evaluation (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Joint Interoperability Test Command Support	Various	Not specified. : TBD	-	0.800	May 2020	0.800	May 2021	0.800	May 2022	-		0.800	-	-	-
CDL Exercise Support	MIPR	Various : Various	-	0.500	Dec 2019	0.500	Dec 2020	0.500	Dec 2021	-		0.500	-	-	-
Subtotal			-	1.300		1.300		1.300		-		1.300	-	-	N/A
Management Services (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
MITRE Engineering Direct Mission Support (FFRDC)	SS/CPFF	MITRE Corp. : Bedford, MA	-	5.800	Oct 2019	5.750	Oct 2020	5.880	Oct 2021	-		5.880	-	-	-
PMO Support - AFLCMC (HNAG)	C/CPFF	Various : Various, MA	-	3.500	Nov 2019	3.422	Nov 2020	3.000	Oct 2021	-		3.000	-	-	-
Subtotal			-	9.300		9.172		8.880		-		8.880	-	-	N/A
Project Cost Totals			-	36.893		39.221		43.881		-		43.881	-	-	N/A

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Exhibit R-4, RDT&E Schedule Profile: PB 2022 Air Force			Date: May 2021
Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0305236F / <i>Common Data Link Executive Agent (CDL EA)</i>	Project (Number/Name) 641334 / <i>Common Data Link (CDL)</i>	

	FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Common Data Link																												
CDL Technology Advancement																												
- CDL Protective Waveform (LPD/AJ) Advancement																												
- Networking (Multi-Access) Advancement																												
- Antenna Modernization (Networking and LPD/AJ)																												
- BE CDL to Group 1 UAV																												
CDL Specification Development, Validation, Test and Maintenance																												
- CDL Compliance Test Set																												
CDL Cryptographic Modernization																												
- US/Coalition Multi-algorithm Crypto Core Modules (Generation 2/3)																												
- US Multi-algorithm Crypto Core Modules (Generation 2/3)																												

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Exhibit R-4A, RDT&E Schedule Details: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0305236F / <i>Common Data Link Executive Agent (CDL EA)</i>	Project (Number/Name) 641334 / <i>Common Data Link (CDL)</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
Common Data Link				
CDL Technology Advancement	1	2020	4	2022
- CDL Protective Waveform (LPD/AJ) Advancement	1	2020	4	2022
- Networking (Multi-Access) Advancement	1	2020	4	2022
- Antenna Modernization (Networking and LPD/AJ)	1	2020	4	2022
- BE CDL to Group 1 UAV	1	2020	3	2022
CDL Specification Development, Validation, Test and Maintenance	1	2020	4	2022
- CDL Compliance Test Set	1	2020	1	2022
CDL Cryptographic Modernization	1	2020	4	2022
- US/Coalition Multi-algorithm Crypto Core Modules (Generation 2/3)	1	2020	4	2022
- US Multi-algorithm Crypto Core Modules (Generation 2/3)	1	2020	4	2022

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 0305251F / <i>Cyberspace Operations Forces and Force Support</i>
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COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
Total Program Element	-	0.000	20.000	0.000	0.000	0.000	-	-	-	-	-	-
646008: <i>US Cyber Command Technology Development</i>	-	0.000	20.000	0.000	0.000	0.000	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-	-	-

Note

FY21 Congressional Add for Cyber kinetic combat environment to fund RDT&E Efforts at Playas Training and Research Environment (PTRE) The cyber kinetic combat environment was funded in FY18 in Budget Line 170 Defense Operations Security Initiative (DOSI), PE 020 334 5D8Z; in FY19 funding was in Budget line 171 Defense Operations Security (OPSEC), PE 020 334 5D8Z; and in FY20 funding was in Budget Line 176 Defense Operations Security Initiative (DOSI), PE 020 334 5D8Z

A. Mission Description and Budget Item Justification

Mission Description.

The Cyber Capabilities Support Office (CCSO) within the Air Force Concepts, Development, and Management (SAF/CDM) Office is partnered with the New Mexico Institute of Mining and Technology (NMT) to develop the Playas Training and Research Environment (PTRE) at the NMT. This team will: develop a vision and strategy for Multi Domain Operations at the PTRE, facilitate build-out of a research and experimentation environment supporting evaluation and development of Full-Spectrum Multi-Domain Operations from Cyber, Cognitive, Supervisory control and data acquisition (SCADA), to include Terrestrial and airspace through space domains. The development team will also design and develop an "Operator in the Loop" research methodology enabling researchers to evaluate research hypotheses via access to operational platforms to simultaneously conduct integrated training and exercise events. Additionally, the team will establish and re-engineer business processes and usher programs/projects from conceptualization through transition to operational and Service components.

Budget Item Justification

The NMT in conjunction with the Cyber Capabilities Support Office, will develop an environment at the Playas Training and Research Environment (PTRE) to advance DoD Information Dominance capabilities and effectiveness in support of the National Defense Strategy by replicating a multi-domain, information warfare combat environment for simultaneous operations, cyber enabled kinetic operations, or physically enabled cyber operations, while reducing the research-to-operational fielding timeline.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver weapon system capability. The use of such programs funds would be in addition to the civilian pay expenses budgeted in program element 0304369F. In FY20 \$0.000 was expended for civilian pay expenses in this program element, and in FY21 \$0.400 is forecasted for civilian pay expenses in this program element."

This effort is in Budget Activity 4, Advanced Component Development and Prototypes (ACD&P), because efforts are necessary to evaluate integrated technologies, representative modes or prototype systems in a high fidelity and realistic operating environment.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600: Research, Development, Test & Evaluation, Air Force I BA 4: Advanced Component Development & Prototypes (ACD&P)	R-1 Program Element (Number/Name) PE 0305251F I Cyberspace Operations Forces and Force Support
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B. Program Change Summary (\$ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Previous President's Budget	35.000	0.000	0.000	0.000	0.000
Current President's Budget	0.000	20.000	0.000	0.000	0.000
Total Adjustments	-35.000	20.000	0.000	0.000	0.000
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	20.000			
• Reprogrammings	-35.000	0.000			
• SBIR/STTR Transfer	0.000	0.000			
• Other Adjustments	0.000	0.000	0.000	0.000	0.000

Congressional Add Details (\$ in Millions, and Includes General Reductions)

Project: 646008: US Cyber Command Technology Development

Congressional Add: CCSO Tech Development

Congressional Add Subtotals for Project: 646008

Congressional Add Totals for all Projects

	FY 2020	FY 2021
	-	20.000
	-	20.000
	-	20.000

Change Summary Explanation

Reprogramming occurred in FY2020, PE 0305251F, Cyberspace Operations Forces and Force Support, Project 646008, US Cyber Command Technology Development efforts were transferred to PE 0208087F, Distributed Cyber Warfare Operations, Project 674540, Cyber Tech Products - Payloads, to consolidate prototyping and development of cyber payload capabilities.

C. Accomplishments/Planned Programs (\$ in Millions)

Congressional Add: CCSO Tech Development

FY 2021 Plans: Developing a vision and strategy for Multi Domain Operations at the Playas Training and Research Environment (PTRE)

- Facilitating the build-out of a research and experimentation environment that supports evaluation and development of Full-Spectrum Multi-Domain Operations, from Cyber, Cognitive, Supervisory control and data acquisition (SCADA), Terrestrial, Airspace through Space domains

	FY 2020	FY 2021
	-	20.000

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 0305251F / <i>Cyberspace Operations Forces and Force Support</i>
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C. Accomplishments/Planned Programs (\$ in Millions)	FY 2020	FY 2021
<ul style="list-style-type: none"> - Developing an "Operator in the Loop" research methodology that enables researchers to evaluate research hypotheses utilizing access to operational platforms to simultaneously develop and conduct integrated training and exercise events - Establishing and re-engineering business processes, ushering programs/projects from conceptualization through transition to operational and Service components 		
Congressional Adds Subtotals	-	20.000

D. Other Program Funding Summary (\$ in Millions)

N/A

Remarks

E. Acquisition Strategy

The Cyber Capabilities Support Office utilizes a tailorable acquisition strategy that facilitates rapid delivery of material and non-material solutions to solve operational Offensive Cyber Operations requirements. This approach allows flexibility for solutions to enter the acquisitions process at any phase of the acquisition life cycle. All plans contain sufficient information for the Milestone Decision Authority to determine readiness to enter into the applicable phase of the acquisition process. CCSO, in conjunction with the Air Force Research Lab (AFRL) and the New Mexico Institute of Mining and Technology (NMT), provides the direction, equipment, research and development, developmental testing, operational test and evaluation, necessary facilities, legal and associated costs supporting cyber innovation leveraging cyber kinetic combat environment funding. In FY21, funds primarily utilize the Playas Electronic Attack & Cyber Environment (PEACE) contract held by AFRL. The PEACE contract provides acquisition of the infrastructure, material and services necessary to implement the strategic vision and assist in the transition of operations to Air Combat Command (ACC) in FY23. In addition, GSA contracts will provide MAJCOM Liaison, SME Program Management Support and SME SETA support.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0305251F / <i>Cyberspace Operations Forces and Force Support</i>	Project (Number/Name) 646008 / <i>US Cyber Command Technology Development</i>
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Product Development (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Develop vision and strategy; build-out of a research and experimentation environment; Develop "Operator in the Loop" research methodology; Establish and re-engineer business processes	C/CPAF	New Mexico Tech : Socorro, NM	-	0.000		16.913	Apr 2021	0.000		0.000		0.000	-	-	-
Subtotal			-	0.000		16.913		0.000		0.000		0.000	-	-	N/A

Support (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Air Combat Command Liaison ,Subject Matter Expert Program Support - Smartronix 47QFCA19F0003	C/CPAF	SMARTRONIX : California, MD	-	0.000		1.877	Apr 2021	0.000		0.000		0.000	-	-	-
Systems Engineering and Technical Assistance (SETA) Support - GSA Noblis 47QFNA19F0075	C/CPAF	NOBLIS : Reston, VA	-	0.000		0.370	Sep 2021	0.000		0.000		0.000	-	-	-
Gov Civilian Pay	TBD	US Gov Civilian : Washington, DC	-	0.000		0.400	May 2021	0.000		0.000		0.000	-	-	-
Subtotal			-	0.000		2.647		0.000		0.000		0.000	-	-	N/A

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Exhibit R-4, RDT&E Schedule Profile: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0305251F / <i>Cyberspace Operations Forces and Force Support</i>	Project (Number/Name) 646008 / <i>US Cyber Command Technology Development</i>

FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

<i>Cyber Kinetic Combat Environment</i>	
Develop a vision and strategy for Multi Domain Operations at the Playas Training and Research Environment (PTRE)	████████████████████
Facilitate the build-out of a research and experimentation environment	████████████████████
Develop an "Operator in the Loop research methodology	████████████████████
Establishing and re-engineering business processes	████████████████████

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Exhibit R-4A, RDT&E Schedule Details: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0305251F / <i>Cyberspace Operations Forces and Force Support</i>	Project (Number/Name) 646008 / <i>US Cyber Command Technology Development</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>Cyber Kinetic Combat Environment</i>				
Develop a vision and strategy for Multi Domain Operations at the Playas Training and Research Environment (PTRE)	3	2021	4	2022
Facilitate the build-out of a research and experimentation environment	3	2021	4	2022
Develop an "Operator in the Loop research methodology	3	2021	4	2022
Establishing and re-engineering business processes	3	2021	4	2022

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 0305601F / <i>Mission Partner Environments</i>
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COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
Total Program Element	-	8.237	11.409	16.420	0.000	16.420	-	-	-	-	-	-
643783: <i>CENTRIXs Networks</i>	-	8.237	11.409	16.420	0.000	16.420	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-	-	-

A. Mission Description and Budget Item Justification

Mission Partner Environment (MPE) enables secure sharing of operational information for collaboration between and among the United States (US) and mission partners to include federal, state, local, and tribal agencies, allies, coalition members, host nations, and other nations, US and international Non-Governmental Organizations, multinational treaty organizations, and private sector organizations. MPE enables the US Department of Defense (DoD) to execute its assigned missions with mission partners across all phases of operations to assist combined command and control (C2) of coalition forces while meeting the information sharing requirements within existing bi-lateral and multi-lateral agreements. Also, it promotes effective information exchange and provides applications to enable effective use of the US and Partner nation military power. MPE provides the warfighter mission with technology to improve mission effectiveness and cyber security.

DoD Directive 5101.22E, effective August 5, 2020, designated the Secretary of the Air Force as Executive Agent (EA) for the DoD Mission Partner environment. The EA, through the Mission Partner Capabilities Office provides DoD wide enterprise-level development, integration, systems engineering, architecture, and synchronized delivery of mission capabilities to include DoD-wide enterprise services that support joint and multinational warfighting functional information sharing. Additionally, the EA executes enterprise-level MPE PPBE activities to coordinate the development of MPE budget requirements and provide recommendations to OSD Principle Staff Assistants for PPBE guidance and to the DoD Component heads for performance guidance. The EA also documents the DoD MPE to provide a comprehensive understanding that informs future technical solutions. The FY2022 funding procures hardware and software to support the rationalization, consolidation and modernization of a common mission network capability that supports operations with the MPE.

This funding supports the testing, integration, and delivery of procedures, workstations, switches, servers, cross-domain services, communications infrastructure, video teleconference suites, network equipment, storage and backup, encryption equipment, software licenses, infrastructure, deployable suites and software communications. Variations in quantity and unit price reflect planned capital investment. This funding further supports Coalition Interoperability Assurance and Validation (CIAV) technical, analytical, and engineering support to resolve C2 interoperability challenges and evaluate existing and emerging cyber capabilities and the development of the National Information Exchange Model (NIEM) in support of the MPE ecosystem. This effort is in Budget Activity 4, Advanced Component Development and Prototypes (ACD&P), because efforts are necessary to evaluate integrated technologies, representative modes or prototype systems in a high fidelity and realistic operating environment.

This effort is in Budget Activity 4, Advanced Component Development and Prototypes (ACD&P), because efforts are necessary to evaluate integrated technologies, representative modes or prototype systems in a high fidelity and realistic operating environment.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force	Date: May 2021
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Appropriation/Budget Activity 3600: Research, Development, Test & Evaluation, Air Force I BA 4: Advanced Component Development & Prototypes (ACD&P)	R-1 Program Element (Number/Name) PE 0305601F I Mission Partner Environments
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B. Program Change Summary (\$ in Millions)	<u>FY 2020</u>	<u>FY 2021</u>	<u>FY 2022 Base</u>	<u>FY 2022 OCO</u>	<u>FY 2022 Total</u>
Previous President's Budget	8.550	11.430	16.667	0.000	16.667
Current President's Budget	8.237	11.409	16.420	0.000	16.420
Total Adjustments	-0.313	-0.021	-0.247	0.000	-0.247
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	-0.313	0.000			
• Other Adjustments	0.000	-0.021	-0.247	0.000	-0.247

Change Summary Explanation

FY21 to FY22 increase to meet expanded capabilities in mission sets.

C. Accomplishments/Planned Programs (\$ in Millions)	<u>FY 2020</u>	<u>FY 2021</u>	<u>FY 2022</u>
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Title: Mission Partner Environment	8.237	11.409	16.420
Description: Mission Partner Environment (MPE) enables secure sharing of operational information for collaboration between and among the United States (US) and mission partners to include federal, state, local, and tribal agencies, allies, coalition members, host nations, and other nations, US and international Non-Governmental Organizations, multinational treaty organizations, and private sector organizations.			
FY 2021 Plans: Continue development, integration, and testing of core C2 mission capabilities with increased capacities and integration into the cross national, cross organizational, and cross domain accreditation for C2 mission capabilities, and continuity of operations for enterprise services.			
Continue development, integration, and testing of an enterprise architectural engineering solution to combine multiple coalition information sharing capabilities into a single Mission Partner Environment, to include modifications necessary to absorb legacy systems capabilities and capacities.			
FY 2022 Plans: Continue development, integration, and testing of core C2 mission capabilities with increased capacities and integration into the cross national, cross organizational, and cross domain accreditation for C2 mission capabilities, and continuity of operations for enterprise services.			

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force	Date: May 2021
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Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 0305601F / <i>Mission Partner Environments</i>
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C. Accomplishments/Planned Programs (\$ in Millions)	FY 2020	FY 2021	FY 2022
Continue development, integration, and testing of an enterprise architectural engineering solution to combine multiple coalition information sharing capabilities into a single Mission Partner Environment, to include modifications necessary to absorb legacy systems capabilities and capacities. FY 2021 to FY 2022 Increase/Decrease Statement: Funding increase to meet user requirements to develop and field evolving mission sets.			
Accomplishments/Planned Programs Subtotals	8.237	11.409	16.420

D. Other Program Funding Summary (\$ in Millions)											
<u>Line Item</u>	<u>FY 2020</u>	<u>FY 2021</u>	<u>FY 2022</u> <u>Base</u>	<u>FY 2022</u> <u>OCO</u>	<u>FY 2022</u> <u>Total</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>FY 2026</u>	<u>Cost To Complete</u>	<u>Total Cost</u>
• O&M PE 0305601F: <i>Mission Partner Environment</i>	79.614	139.833	133.340	-	133.340	-	-	-	-	-	-
• OPAF 03 834010: <i>General Information Technology</i>	1.585	0.478	1.553	-	1.553	-	-	-	-	-	-

Remarks
N/A

E. Acquisition Strategy
Performance-based contracts are primarily used for this support. MPE maximizes the use of competitive awards and uses various contract types, employs large and small contractors, and is focused to achieve agency socio-economic goals and incorporate DoD acquisition reform initiatives.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0305601F / <i>Mission Partner Environmen</i> <i>ts</i>	Project (Number/Name) 643783 / <i>CENTRIXs Networks</i>
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Product Development (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Cross Domain Solution Ops Capabiliites	C/FFP	MITRE Corporaton : McLean, VA	-	8.237	Mar 2020	11.409	Mar 2021	16.420	Mar 2022	-		16.420	-	-	-
Subtotal			-	8.237		11.409		16.420		-		16.420	-	-	N/A
Project Cost Totals			-	8.237		11.409		16.420		-		16.420	-	-	N/A

Remarks
N/A

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Exhibit R-4, RDT&E Schedule Profile: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0305601F / <i>Mission Partner Environmen</i> <i>ts</i>	Project (Number/Name) 643783 / <i>CENTRIXs Networks</i>

FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

Development, testing of capabilities, and integration of capacities into mission capabilities with continuity of operations for enterprise services

Mission Partner Environment

Development, integration & testing of an architectural engineering solution to combine coalition sharing capabilities into a single environment, to modify legacy systems capabilities and capacities

Mission Partner Environment

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Exhibit R-4A, RDT&E Schedule Details: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0305601F / <i>Mission Partner Environmen</i> <i>ts</i>	Project (Number/Name) 643783 / <i>CENTRIXs Networks</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>Development, testing of capabilities, and integration of capacities into mission capabilities with continuity of operations for enterprise services</i>				
Mission Partner Environment	1	2020	4	2025
<i>Development, integration & testing of an architectural engineering solution to combine coalition sharing capabilities into a single environment, to modify legacy systems capabilities and capacities</i>				
Mission Partner Environment	1	2020	4	2026

Note

N/A

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity					R-1 Program Element (Number/Name)							
3600: <i>Research, Development, Test & Evaluation, Air Force I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>					PE 0306250F / <i>Cyber Operations Technology Support</i>							
COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
Total Program Element	-	194.958	234.395	242.499	0.000	242.499	-	-	-	-	-	-
646008: <i>US Cyber Command Technology Development</i>	-	194.958	234.395	242.499	0.000	242.499	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note
 In FY2020, elements of PE 0306250F, Cyber Operations Technology Development, Project Joint Common Services efforts were transferred to PE 0208097F, Joint Cyber Command and Control, in order to increase clarity and delineation from other activities.

A. Mission Description and Budget Item Justification
 US Cyber Command's (USCYBERCOM) mission is to deter or defeat strategic threats to US interests and infrastructure, provide mission assurance for the operations and defense of the Department of Defense information environment, and support the achievement of Joint Force Commander objectives.

USCYBERCOM in conjunction with the Services and National Agencies will develop and expand infrastructure architectures and capabilities/tools to support Cyber Mission Forces (CMF). Focus is on four broad program areas: Joint Common Services, Joint Access Platforms, Joint Weapons, and Joint Sensors.

The specific details and aspects of these cyber activities are classified and will be provided on a need-to-know basis. Please contact USCYBERCOM, 443-634-7769.

This effort is in Budget Activity 4, Advanced Component Development and Prototypes (ACD&P), because efforts are necessary to evaluate integrated technologies, representative modes or prototype systems in a high fidelity and realistic operating environment.

B. Program Change Summary (\$ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Previous President's Budget	202.364	259.823	256.961	0.000	256.961
Current President's Budget	194.958	234.395	242.499	0.000	242.499
Total Adjustments	-7.406	-25.428	-14.462	0.000	-14.462
• Congressional General Reductions	0.000	-25.428			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	-7.406	0.000			
• Other Adjustments	0.000	0.000	-14.462	0.000	-14.462

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force	Date: May 2021
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Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 0306250F / <i>Cyber Operations Technology Support</i>
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Congressional Add Details (\$ in Millions, and Includes General Reductions)

Project: 646008: *US Cyber Command Technology Development*
Congressional Add: *Cloud Communications Validation Pilot*

	FY 2020	FY 2021
Congressional Add Subtotals for Project: 646008	3.500	-
Congressional Add Totals for all Projects	3.500	-

C. Accomplishments/Planned Programs (\$ in Millions)

	FY 2020	FY 2021	FY 2022
<p>Title: Joint Common Services</p> <p>Description: Provides mission/business enabling IT infrastructures, business IT capabilities and life-cycle sustainment; supports internal mission/business operations for USCYBERCOM; and enables JCWA efforts across USCYBERCOM.</p> <p>The origin, details, and specific aspects of these efforts are classified and will be provided on a need-to-know basis. Please contact USCYBERCOM, 443-479-2602.</p> <p>FY 2021 Plans: Continue the development of the JCWA as the common joint capability to enable split-based, offensive and defensive operations.</p> <p>Continue development of USCYBERCOM cross-domain solutions that enable automated data flow from access platform to data repository and enable enrichment of data and reporting across security domains.</p> <p>Continue development of technologies, policies, and processes needed to enable Intelligence and "indicator" sharing across the DODIN tiers and domains.</p> <p>Provide enrichment of USCYBERCOM Title 10 data with additional Title 50 sources.</p> <p>Drive standards and interoperability of JCWA.</p> <p>Provide critical support to a developing and maturing Acquisition and Contracting entities and improve the efficiency and effectiveness of program management and acquisition processes.</p> <p>Some aspects of the efforts are classified and will be provided on a need-to-know basis. For further information, please contact USCYBERCOM, 443-479-2602.</p>	36.198	43.078	60.483

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force		Date: May 2021		
Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>		R-1 Program Element (Number/Name) PE 0306250F / <i>Cyber Operations Technology Support</i>		
C. Accomplishments/Planned Programs (\$ in Millions)		FY 2020	FY 2021	FY 2022
<p>N/A</p> <p>FY 2022 Plans: Will continue the development of the JCWA as the common joint capability to enable split-based, offensive and defensive operations. Continue sustainment of cyber operations capabilities in support of the CMF.</p> <p>Will continue development of USCYBERCOM cross-domain solutions that enable automated data flow from access platform to data repository and enable enrichment of data and reporting across security domains. Continue expansion, sustainment and compliance of fielded capabilities in support of cyber operations.</p> <p>Will continue development of technologies, policies, and processes needed to enable Intelligence and "indicator" sharing across the DODIN tiers and domains.</p> <p>Will continue to provide enrichment of USCYBERCOM Title 10 data with additional Title 50 sources.</p> <p>Will continue to drive standards and interoperability of JCWA.</p> <p>Will continue to provide critical support to a developing and maturing Acquisition and Contracting entities and improve the efficiency and effectiveness of program management and acquisition processes.</p> <p>FY 2021 to FY 2022 Increase/Decrease Statement: Funding increased due to program realignments from Joint Sensors to Joint Common Services related to Commercial Threat Data and Data Science Support Team efforts.</p>				
<p>Title: Joint Access Platforms</p> <p>Description: Delivers infrastructures and systems that enable access to networks through traditional and non-traditional means.</p> <p>The origin, details, and specific aspects of these efforts are classified and will be provided on a need-to-know basis. Please contact USCYBERCOM, 443-479-2602.</p> <p>FY 2021 Plans: Continue development and deployment of on-net operations infrastructure.</p> <p>Continue to develop improvements for client/server platforms that delivers multiple mission-based cyber effects.</p>		61.495	60.199	48.055

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force		Date: May 2021		
Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>		R-1 Program Element (Number/Name) PE 0306250F / <i>Cyber Operations Technology Support</i>		
C. Accomplishments/Planned Programs (\$ in Millions)		FY 2020	FY 2021	FY 2022
<p>Continue development of operational system that delivers distributed denial of service (DDoS) capabilities on the Department Of Defense Information Network (DODIN).</p> <p>Some aspects of the efforts are classified and will be provided on a need-to-know basis. For further information, please contact USCYBERCOM, 443-479-2602.</p> <p>FY 2022 Plans: Will complete a technology refresh and upgrade of the Security Operations Center (SOC) to conduct advanced analytics of on-net operations infrastructure.</p> <p>Will continue to develop OpenCPI applications against strategic targets and expand the suite of supported hardware.</p> <p>Will scale the deployment of proven access enabling components across strategic target spaces and integrate resulting data feeds into Common Operating Pictures(s).</p> <p>FY 2021 to FY 2022 Increase/Decrease Statement: Funding decreased due transition from development to sustainment of cyber capabilities related to Missile Defense and Defeat Enhancement (MDDE) efforts.</p>				
<p>Title: Joint Weapons</p> <p>Description: Capabilities that are developed, tested, stored, and employed for cyberspace operations.</p> <p>The origin, details, and specific aspects of these efforts are classified and will be provided on a need-to-know basis. Please contact USCYBERCOM, 443-479-2602.</p> <p>FY 2021 Plans: Continue to enhance and sustain exploitation frameworks supporting CMF operations based on evolving operations requirements.</p> <p>Continue the research, development, integration, and procurement of mission-focused exploit capabilities as a service to support CMF operations.</p> <p>Continue to update Personal Security Protection Testing Services to ensure they support current test needs.</p> <p>Continue to perform Operational Evaluation and Acceptance testing of Foundational Tools.</p>		87.026	116.287	116.351

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force		Date: May 2021		
Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>		R-1 Program Element (Number/Name) PE 0306250F / <i>Cyber Operations Technology Support</i>		
C. Accomplishments/Planned Programs (\$ in Millions)		FY 2020	FY 2021	FY 2022
<p>Continue to develop and deliver additional foundational tools suites to incrementally achieve a full complement of required capabilities. The foundational tool suites will provide operational agility for CMF cyberspace operations.</p> <p>Continue to measure signatures on each spiral of delivered tools to verify uniqueness of tools.</p> <p>Continue to develop and deliver specialized tools and exploits to CMF.</p> <p>Some aspects of the efforts are classified and will be provided on a need to know basis. For further information, please contact USCYBERCOM, 443-479-2602.</p> <p>FY 2022 Plans: Will continue to enhance and sustain common service exploitation frameworks supporting CMF operations based on evolving operational requirements.</p> <p>Will continue the research, development, integration, and procurement of mission-focused exploit capabilities as a common service to support CMF operations.</p> <p>Will continue to update Personal Security Protection Testing Services to ensure they support current test needs and facilitate delivered cyber weapons through operational acceptance.</p> <p>Will continue to perform Functional Acceptance Testing and deliver fully tested foundational cyber weapons into the Government's Development Evaluation (DE) and Operational Evaluation (OE) processes.</p> <p>Will continue to develop and deliver independently-tested foundational tools suites to incrementally achieve a full complement of required capabilities. The foundational tool suites will provide operational agility for CMF cyberspace operations.</p> <p>Will continue to measure signatures on each spiral of delivered tools to verify uniqueness of tools and diversity of source code.</p> <p>Will continue to develop and deliver specialized tools, exploits, and research to CMF that will enable access to "hard targets."</p> <p>FY 2021 to FY 2022 Increase/Decrease Statement: Funding increased due to inflationary adjustment.</p>				
Title: Joint Sensors		6.739	14.831	17.610

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force		Date: May 2021		
Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>		R-1 Program Element (Number/Name) PE 0306250F / <i>Cyber Operations Technology Support</i>		
C. Accomplishments/Planned Programs (\$ in Millions)		FY 2020	FY 2021	FY 2022
<p>Description: Development of capabilities to collect, process, analyze, and share data elements both on- and off-DoDIN environments. Includes both dynamically emplaced capabilities and static, enduring systems and applications.</p> <p>The origin, details and specific aspects of these efforts are classified and will be provided on a need-to-know basis. Please contact USCYBERCOM, 443-479-2602.</p> <p>FY 2021 Plans: Continue development and sustainment of Advanced Frameworks and accompanying Data Analytics for cyber operations.</p> <p>Leverage findings of FY20 pilot activities to implement sensors, monitoring, and analytic capabilities to enable mission owners to rapidly gain situational awareness and direct defense of NC3 networks.</p> <p>Many aspects of the effort are classified and will be provided on a need-to-know basis. For further information, please contact USCYBERCOM at 443-479-2602.</p> <p>FY 2022 Plans: Work towards consolidation of Advanced Frameworks for cyber operations, situational awareness, and risk assessment and mitigation into a multiple-purpose solution in Unified Platform.</p> <p>Incorporate new advanced risk management tool from research labs into risk assessment component of Unified Platform.</p> <p>Leverage new capabilities and analytics for countering malign influence campaigns to support operations in defense of 2022 midterm elections; document lessons learned.</p> <p>Implement automated anomaly detection and mitigation analytics for defense of critical DoD command and control communications infrastructures.</p> <p>FY 2021 to FY 2022 Increase/Decrease Statement: Funding increased due to planned development of critical cyber defense capabilities in support of Nuclear Command, Control and Communications (NC3) networks.</p>				
Accomplishments/Planned Programs Subtotals		191.458	234.395	242.499
		FY 2020	FY 2021	
Congressional Add: Cloud Communications Validation Pilot		3.500	-	

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 0306250F / <i>Cyber Operations Technology Support</i>
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	FY 2020	FY 2021
FY 2020 Accomplishments: Funding acquires a capability to use transport layer identity management with non-interactive authentication at the first packet of a TCP/IP request to validate machine-to-machine communications. Such capability will "cloak" (i.e., render invisible) the existence of government networks and cloud deployments from our adversaries, while simultaneously authenticating the communication.		
Congressional Adds Subtotals	3.500	-

D. Other Program Funding Summary (\$ in Millions)

<u>Line Item</u>	<u>FY 2020</u>	<u>FY 2021</u>	<u>FY 2022</u> <u>Base</u>	<u>FY 2022</u> <u>OCO</u>	<u>FY 2022</u> <u>Total</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>FY 2026</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• OPAF 03 834320: C3 Countermeasures	-	11.986	9.981	-	9.981	-	-	-	-	-	-

Remarks

E. Acquisition Strategy

Facilitate the delivery of technology capabilities to the Cyber Mission Forces, by applying innovative solutions for existing and emerging technologies. Contracts are awarded under full and open competition whenever possible. Variations of both Fixed Price (FP) and Cost Plus (CP) contracting vehicles and the use of Other Transactional Authority (OTA) will be implemented leveraging USCYBERCOM Acquisition authorities. USCYBERCOM will also rely on various Service Component, Combatant Command and National Security Agency contracting offices for procurement of cyber capabilities and contractor support.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0306250F / <i>Cyber Operations Technol ogy Support</i>	Project (Number/Name) 646008 / <i>US Cyber Command Technology Development</i>
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Product Development (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Product Development	C/Various	Not specified. : NV	-	0.000		0.000		0.000		-		0.000	-	-	-
Joint Common Services	Various	Multiple Agencies : Various	-	35.607	Jan 2020	42.122	Apr 2021	59.202	Apr 2022	-		59.202	-	-	-
Joint Access Platforms	Various	Multiple Agencies : Various	-	60.491	Jan 2020	58.863	Apr 2021	47.037	Apr 2022	-		47.037	-	-	-
Joint Tools	Various	Multiple Agencies : Various	-	85.606	Jan 2020	113.706	Apr 2021	113.886	Apr 2022	-		113.886	-	-	-
Joint Sensors	Various	Multiple Agencies : Various	-	6.629	Jan 2020	14.502	Apr 2021	17.237	Apr 2022	-		17.237	-	-	-
Cloud Communication Validation Pilot	TBD	TBD : TBD	-	3.500	Dec 2020	-		-		-		-	-	-	-
Subtotal			-	191.833		229.193		237.362		-		237.362	-	-	N/A

Management Services (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Management Services	C/CPAF	Not specified. : TBD	-	0.000		0.000		0.000		-		0.000	-	-	-
PMA	Various	Various : Various	-	3.125	Jan 2020	5.202	Apr 2021	5.137	Apr 2022	-		5.137	-	-	-
Subtotal			-	3.125		5.202		5.137		-		5.137	-	-	N/A

			Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals			-	194.958	234.395	242.499	-	242.499	-	-	N/A

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0306250F / <i>Cyber Operations Technology Support</i>	Project (Number/Name) 646008 / <i>US Cyber Command Technology Development</i>

FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

<i>Cyber Operations Technology Development</i>	
Scalable resilient infrastructure (Joint Common Services)	[REDACTED]
CYBERCOM access platform build out capacity (Joint Access Platforms)	[REDACTED]
Mission-based platform FOC (Joint Access Platforms)	[REDACTED]
DDoS for DODIN spiral development (Joint Access Platforms)	[REDACTED]
Cyber UCAP spiral development - 1 (Joint Weapons)	[REDACTED]
Exploitation framework spiral development (annual) - (Joint Weapons)	[REDACTED]
Foundational tool suites (spirals annual) (Joint Weapons)	[REDACTED]
Analytics development (Joint Sensors)	[REDACTED]
Cloud Communication Validation Pilot	[REDACTED]

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Exhibit R-4A, RDT&E Schedule Details: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0306250F / <i>Cyber Operations Technology Support</i>	Project (Number/Name) 646008 / <i>US Cyber Command Technology Development</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>Cyber Operations Technology Development</i>				
Scalable resilient infrastructure (Joint Common Services)	1	2020	4	2022
CYBERCOM access platform build out capacity (Joint Access Platforms)	1	2020	4	2022
Mission-based platform FOC (Joint Access Platforms)	1	2020	3	2022
DDoS for DODIN spiral development (Joint Access Platforms)	1	2020	4	2022
Cyber UCAP spiral development - 1 (Joint Weapons)	3	2020	2	2021
Exploitation framework spiral development (annual) - (Joint Weapons)	1	2020	4	2022
Foundational tool suites (spirals annual) (Joint Weapons)	1	2020	4	2022
Analytics development (Joint Sensors)	1	2020	4	2022
Cloud Communication Validation Pilot	1	2021	2	2022

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 0306415F / <i>Enabled Cyber Activities</i>
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COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
Total Program Element	-	16.024	10.541	16.578	0.000	16.578	-	-	-	-	-	-
646008: <i>US Cyber Command Technology Development</i>	-	16.024	10.541	16.578	0.000	16.578	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

US Cyber Command's (USCYBERCOM) mission is to deter or defeat strategic threats to US interests and infrastructure, provide mission assurance for the operations and defense of the Department of Defense information environment, and support the achievement of joint force commander objectives.

USCYBERCOM develops or procures capabilities to enable Electronic Warfare and cyber-peculiar technologies for use by the Cyber Mission Forces (CMF).

The specific details and aspects of these cyber activities are classified and will be provided on a need-to-know basis. Please contact USCYBERCOM at 443-479-2602.

This effort is in Budget Activity 4, Advanced Component Development and Prototypes (ACD&P), because efforts are necessary to evaluate integrated technologies, representative modes or prototype systems in a high fidelity and realistic operating environment.

B. Program Change Summary (\$ in Millions)	<u>FY 2020</u>	<u>FY 2021</u>	<u>FY 2022 Base</u>	<u>FY 2022 OCO</u>	<u>FY 2022 Total</u>
Previous President's Budget	16.632	10.560	17.242	0.000	17.242
Current President's Budget	16.024	10.541	16.578	0.000	16.578
Total Adjustments	-0.608	-0.019	-0.664	0.000	-0.664
• Congressional General Reductions	0.000	-0.019			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	-0.608	0.000			
• Other Adjustments	0.000	0.000	-0.664	0.000	-0.664

C. Accomplishments/Planned Programs (\$ in Millions)

	<u>FY 2020</u>	<u>FY 2021</u>	<u>FY 2022</u>
Title: Cyber Technology Development	16.024	10.541	16.578

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force		Date: May 2021		
Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>		R-1 Program Element (Number/Name) PE 0306415F / <i>Enabled Cyber Activities</i>		
C. Accomplishments/Planned Programs (\$ in Millions)		FY 2020	FY 2021	FY 2022
<p>Description: Adapted Electronic Warfare (EW) technology to facilitate the development and delivery of EW and cyber-peculiar capabilities.</p> <p>The origin, details and specific aspects of these efforts are classified.</p> <p>FY 2021 Plans: Continue to adapt EW technology and cyber-peculiar capabilities to gain access to targeted enemy forces.</p> <p>Continue to enhance the open source Open CPI framework that will allow the services and USCYBERCOM to develop Title 10 off-net effects.</p> <p>Continue to migrate segregated capabilities and Cyber/EW weapons systems onto Common Attack Platforms by implementing common frameworks and common hosting solutions.</p> <p>The specific details and aspects of these cyber activities are classified and will be provided on a need-to-know basis. Please contact USCYBERCOM at 443-479-2602.</p> <p>FY 2022 Plans: Will continue to adapt EW technology and cyber-peculiar capabilities to gain access to targeted enemy forces.</p> <p>Will continue to enhance the open source Open CPI framework that will allow the services and USCYBERCOM to develop Title 10 off-net effects.</p> <p>Will continue to migrate segregated capabilities and Cyber/EW weapons systems onto Common Attack Platforms by implementing common frameworks and common hosting solutions.</p> <p>The specific details and aspects of these cyber activities are classified and will be provided on a need-to-know basis. Please contact USCYBERCOM at 443-479-2602.</p> <p>FY 2021 to FY 2022 Increase/Decrease Statement: Funding increased in order to align funding with development effort timelines.</p>				
Accomplishments/Planned Programs Subtotals		16.024	10.541	16.578

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force	Date: May 2021
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Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 0306415F / <i>Enabled Cyber Activities</i>
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D. Other Program Funding Summary (\$ in Millions)

N/A

Remarks

E. Acquisition Strategy

Facilitate the delivery of new Electronic Warfare (EW) cyber capability, by applying innovative solutions for existing and emerging technologies. Contracts are awarded under full and open competition whenever possible. Variations of both Fixed Price (FP) and Cost Plus (CP) contracting vehicles will be executed and managed by USCYBERCOM Acquisition authority, as well as various Service Component contracting offices, other Defense Agency contracting offices and the National Security Agency contracting offices.

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Exhibit R-4A, RDT&E Schedule Details: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0306415F / <i>Enabled Cyber Activities</i>	Project (Number/Name) 646008 / <i>US Cyber Command Technology Development</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>Electronic Warfare (EW) Capabilities</i>				
EW Capability Spiral (annual)	1	2020	4	2022
SATCOM Capability Spiral (annual)	1	2020	4	2022
Communications Capabiliy Spiral (annual)	1	2020	4	2022

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 0401310F / <i>C-32 Executive Transport Recapitalization</i>
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COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
Total Program Element	-	0.000	6.197	0.000	0.000	0.000	-	-	-	-	-	-
640009: <i>C-32 Executive Transport Recap</i>	-	0.000	6.197	0.000	0.000	0.000	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-	-	-

A. Mission Description and Budget Item Justification

NOTE: FY18-20 Prior Years Funding of \$7.762M was executed in Program Element 0401310F, BPAC 654019, BA05.

The C-32A mission is to provide Executive Airlift transportation for the First Lady, Vice President, Cabinet, Congress, and foreign Heads of State. The C-32A also serves as the backup to the VC-25 Presidential support aircraft.

The C-32 Executive Transport Recapitalization program was intended to replace the aging C-32A aircraft fleet. The Air Force and Navy were engaged in an effort to recapitalize the National Military Command System fixed-wing aircraft and large capacity Executive Airlift fleets. The aircraft consist of the Air Force E-4B National Airborne Operations Center (NAOC), Air Force C-32A Executive Airlift (EA), and the Navy E-6B Airborne Command Post (ABNCP) and Take Charge and Move Out (TACAMO) aircraft. These platforms are aging and increasingly difficult to support. The combined effort explored the realignment of missions among platforms and examined the potential benefits of acquiring common airframes without sacrificing operational effectiveness or increasing overall costs. This effort was called the NEAT (NNAOC, EEA, A ABNCP, TTACAMO) Analysis of Alternatives (AoA) and it concluded in September 2020 with no impact or actions for the C-32 fleet. After 2020, remaining funding in Program Element 0401310F was applied to the evaluation and maturation of advanced high speed transport scale aircraft with potential to expand the defense industrial base and serve as C-32A replacements at the appropriate time.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver the C-32 Executive Transport Recap system capability. The use of such programs funds would be in addition to the civilian pay expenses budgeted in program element 0605831F. In FY20 \$0.000M was expended for civilian pay expenses in this program element, and in FY21 \$0.000M is forecasted for civilian pay expenses in this program element.

This effort is in Budget Activity 4, Advanced Component Development and Prototypes (ACD&P), because efforts are necessary to evaluate integrated technologies, representative modes or prototype systems in a high fidelity and realistic operating environment.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600: Research, Development, Test & Evaluation, Air Force I BA 4: Advanced Component Development & Prototypes (ACD&P)	R-1 Program Element (Number/Name) PE 0401310F I C-32 Executive Transport Recapitalization
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B. Program Change Summary (\$ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Previous President's Budget	0.000	9.908	9.938	0.000	9.938
Current President's Budget	0.000	6.197	0.000	0.000	0.000
Total Adjustments	0.000	-3.711	-9.938	0.000	-9.938
• Congressional General Reductions	0.000	-3.711			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	0.000	0.000			
• Other Adjustments	0.000	0.000	-9.938	0.000	-9.938

Change Summary Explanation

FY 2021 funding was reduced by \$3.7 million to account for the availability of prior year execution balances.

FY 2022 funding request was reduced by \$9.938 million due to completion of Analysis of Alternative with no impact or actions for the C-32 fleet.

C. Accomplishments/Planned Programs (\$ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Title: C-32A Executive Transport Recapitalization Analysis of Alternatives (AoA)	0.000	6.170	0.000	0.000	0.000
Description: Expand upon the AoA to study viability of advanced commercial derivative aircraft to mitigate capability gaps.					
FY 2021 Plans: Funds in FY21 will expand AoA analysis and studies to inform technical risk areas, evaluate and mature studies of advanced high speed transport scale aircraft, and conduct technology maturation risk reduction activities to inform a future acquisition strategy.					
FY 2022 Base Plans: N/A					
FY 2022 OCO Plans: N/A					
FY 2021 to FY 2022 Increase/Decrease Statement: Funding decreased due to AoA recommendation. No funding required in FY 2022.					
Title: C-32 Executive Transport Recapitalization Program Office Closeout	0.000	0.027	0.000	0.000	0.000

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 0401310F / C-32 Executive Transport Recapitalization
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C. Accomplishments/Planned Programs (\$ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
<p>Description: Support Directorate and Program Office efforts to closeout C-32 Recapitalization activities.</p> <p>FY 2021 Plans: Funds in FY2021 support AoA expansion and technology maturation for alternative aircraft replacements of the C-32A.</p> <p>FY 2022 Base Plans: N/A</p> <p>FY 2022 OCO Plans: N/A</p> <p>FY 2021 to FY 2022 Increase/Decrease Statement: Funding decreased due to no C32A Executive Transport Recap office support required in FY 2022.</p>					
Accomplishments/Planned Programs Subtotals	0.000	6.197	0.000	0.000	0.000

D. Other Program Funding Summary (\$ in Millions)											
<u>Line Item</u>	<u>FY 2020</u>	<u>FY 2021</u>	<u>FY 2022 Base</u>	<u>FY 2022 OCO</u>	<u>FY 2022 Total</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>FY 2026</u>	<u>Cost To Complete</u>	<u>Total Cost</u>
• RDTE 05 0401310F: C-32 Executive Transport Recapitalization	0.000	0.000	0.000	-	0.000	-	-	-	-	-	-

Remarks

E. Acquisition Strategy
AoA expansion will include technology maturation risk reduction activities to inform future C-32A replacement aircraft.

- Early focus on Technology Maturation Risk Reduction on critical performance capabilities identified during material solution analysis phase to support technical maturity of key capabilities and inform requirements for future CDD generation.
- Risk reduction activities and technology maturity assessments outcome will be used to further develop acquisition strategy for a Pre-milestone B entry and subsequent solicitation for a full and open competition.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0401310F / C-32 Executive Transport R ecapitalization	Project (Number/Name) 640009 / C-32 Executive Transport Recap
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Product Development (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Product Development	Various	TBD : TBD	-	0.000		-		-		-		-	-	-	-
C-32 Executive Transport Recapitalization: Analysis of Alternatives Expansion	Various	TBD : TBD	-	0.000		6.170	May 2021	-		-		-	-	-	-
Subtotal			-	0.000		6.170		-		-		-	-	-	N/A

Remarks
FY18-20 Prior Years Funding was executed in PE 0401310F, BPAC 654019, BA05

Management Services (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
C-32 Executive Transport Recapitalization: PMA Contractor Services and PMA Other Government Costs	Various	TBD : Dayton, OH	-	0.000		0.027	May 2021	-		-		-	-	-	-
Subtotal			-	0.000		0.027		-		-		-	-	-	N/A

Remarks
FY18-20 Prior Years Funding of was executed in PE 0401310F, BPAC 654019, BA05

Project Cost Totals	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
	-	0.000	6.197	-	-	-	-	-	N/A

Remarks
-FY2018-2020 RDT&E Funding (\$7.762M) was executed in PE 0401310F, BPAC 654019, BA05

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Exhibit R-4A, RDT&E Schedule Details: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0401310F / C-32 Executive Transport R ecapitalization	Project (Number/Name) 640009 / C-32 Executive Transport Recap

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
C-32 Recap				
Acquisition Strategy Development	1	2021	1	2021
AoA Expansion Studies	1	2021	1	2022

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 0708051F I <i>Rapid Sustainment Modernization (RSM)</i>
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COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
Total Program Element	-	5.802	19.964	0.000	0.000	0.000	-	-	-	-	-	-
648051: <i>Rapid Sustainment Modernization Technologies</i>	-	5.802	19.964	0.000	0.000	0.000	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-	-	-

A. Mission Description and Budget Item Justification

The Rapid Sustainment Modernization program provides funding to the Rapid Sustainment Office (RSO). The RSO will develop, test and deploy new technologies for implementation across the sustainment enterprise, to improve readiness, and reduce sustainment costs.

RSO will achieve this by reaching across the sustainment enterprise to include the warfighter, depot maintenance, field maintenance, supply chain and program offices to identify enterprise needs. RSO will then identify, assess, develop, validate and verify new technology projects that support these areas, all while reducing costs and increasing aircraft readiness

RSO New Sustainment technologies such as; Conditioned Based Mtx Plus (CBM+), Advanced Manufacturing (AM/Coldspray), Digital Engineering, Automation/Robotics, Augmented and Virtual Reality, Austere/Contested environments are evaluated across the technology space in support of the Department of the Air Force (DAF) sustainment enterprise

This is a new program element created based off the FY 2021 appropriation line item 56A. This requirement is not a new start as it was previously funded and executed with DAF Research, Development, Test and Evaluation (RDT&E) funding.

This effort is in Budget Activity 4, Advanced Component Development and Prototypes (ACD&P), because efforts are necessary to evaluate integrated technologies, representative modes or prototype systems in a high fidelity and realistic operating environment.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force	Date: May 2021
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Appropriation/Budget Activity 3600: Research, Development, Test & Evaluation, Air Force I BA 4: Advanced Component Development & Prototypes (ACD&P)	R-1 Program Element (Number/Name) PE 0708051F I Rapid Sustainment Modernization (RSM)
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B. Program Change Summary (\$ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Previous President's Budget	0.000	0.000	0.000	0.000	0.000
Current President's Budget	5.802	19.964	0.000	0.000	0.000
Total Adjustments	5.802	19.964	0.000	0.000	0.000
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	5.802	19.964			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	0.000	0.000			
• Other Adjustments	0.000	0.000	0.000	0.000	0.000

Change Summary Explanation

FY 2022 decreased compared to FY 2021. Decrease is due to FY 2021 funding being a Congressional add.

C. Accomplishments/Planned Programs (\$ in Millions)	FY 2020	FY 2021	FY 2022
Title: Rapid Sustainment Modernization	5.802	19.964	0.000
Description: Advanced Repair and Qualification			
FY 2021 Plans: Digital Engineering/Digital Twin: digital transformation of the existing Air Force fleet to increase operational readiness levels, decrease parts obsolescence and diminishing manufacturing sources required to get mission capable rates to acceptable levels.			
FY 2022 Plans: N/A			
FY 2021 to FY 2022 Increase/Decrease Statement: N/A			
Accomplishments/Planned Programs Subtotals	5.802	19.964	0.000

D. Other Program Funding Summary (\$ in Millions)

N/A

Remarks

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity	R-1 Program Element (Number/Name)
3600: <i>Research, Development, Test & Evaluation, Air Force I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	PE 0708051F / <i>Rapid Sustainment Modernization (RSM)</i>

E. Acquisition Strategy

Funding in this program is used toward Rapid Sustainment Office requirements.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0708051F / <i>Rapid Sustainment Modernization (RSM)</i>	Project (Number/Name) 648051 / <i>Rapid Sustainment Modernization Technologies</i>
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Product Development (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Digital Engineering - Digital Twin	TBD	Various : Wichita, KS	-	-		19.964		-		-		-	-	-	-
Advanced Repair and Qualification Processes	C/Various	Various : Tinker AFB, OK	-	5.802		-		-		-		-	-	-	-
Subtotal			-	5.802		19.964		-		-		-	-	-	N/A

	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	-	5.802	19.964	-	-	-	-	-	N/A

Remarks

FY20 - New areas of additive manufacturing and cold spray technologies, equipment and qualification processes that are maturing and providing benefit to the DAF

FY21 - Digital Engineering/Digital Twin: digital transformation of the existing Air Force fleet to increase operational readiness levels, decrease parts obsolescence and diminishing manufacturing sources required to get mission capable rates to acceptable levels

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Exhibit R-4, RDT&E Schedule Profile: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0708051F / <i>Rapid Sustainment Modernization (RSM)</i>	Project (Number/Name) 648051 / <i>Rapid Sustainment Modernization Technologies</i>

FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

Advanced Repair and Qualification Processes	
AM/Cold Spray	████████████████████
Digital Engineering	
F-16 Digital Twin Effort	████████████████████

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Exhibit R-4A, RDT&E Schedule Details: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0708051F / <i>Rapid Sustainment Modernization (RSM)</i>	Project (Number/Name) 648051 / <i>Rapid Sustainment Modernization Technologies</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>Advanced Repair and Qualification Processes</i>				
AM/Cold Spray	2	2021	4	2022
<i>Digital Engineering</i>				
F-16 Digital Twin Effort	4	2021	4	2023

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 0901410F / <i>Contracting Information Technology System</i>
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COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
Total Program Element	-	22.266	5.662	20.343	0.000	20.343	-	-	-	-	-	-
643483: <i>CON-IT</i>	-	22.266	5.662	20.343	0.000	20.343	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-	-	-

A. Mission Description and Budget Item Justification

The Contracting Information Technology (CON-IT) system replaces 10 aging legacy contract writing and management systems with a single contract management system to support the global Air Force mission. It will consolidate all contract writing, management, and reporting capabilities, as well as provide interoperability across all contracting communities (base operations, contingency operations, weapon systems, research and development (R&D), and logistics). Thus far, CON-IT has completed the first of 5 major capabilities, which modernized contract writing capabilities for base-level and operational users and replaced two of four contract writing systems. Deployed to over 4,164 users across 105 installations worldwide, CON-IT has awarded over 126,000 contract actions totaling 20B to date.

The DAF is modernizing its contracting infrastructure with focus on 5 major capabilities:

- Capability 1: Modernize contract writing for base-level and operational users, allowing the DAF's Standard Procurement System (SPS) and AFCENT's O'ContraX system to sunset
- Capability 2: Modernize capability to meet the unique needs of the Weapon Systems, Research & Development, and Logistics communities, resulting in sunsetting ConWrite and Automated Contract Preparation System
- Capabilities 3 and 4: automate pre/post award activities for the unclassified user base from Capabilities 1 and 2, respectively
- Capability 5: Implement Capabilities 1-4 for classified users.

CON-IT enables the Air Force to anticipate and respond to the changing pace and dynamic nature of processes, regulations, and technologies across the contracting domain. It empowers the contracting community to comply with financial auditability and Financial Improvement Audit Readiness (FIAR) goals. CON-IT supports performance of a full financial audit as required by title 10 U.S.C. Chapter 9A, Sec 240-D.

This program element may include necessary emergent or unanticipated civilian pay expenses required to manage, execute, and deliver CON-IT for emergent or unanticipated weapon system capability. The use of such programs funds would be in addition to the civilian pay expenses budgeted in program element 0605831F. In FY20 \$0.000M was expended for civilian pay expenses in this program element, and in FY21 \$0.000M is forecasted for civilian pay expenses in this program element.

This effort is in Budget Activity 4, Advanced Component Development and Prototypes (ACD&P), because efforts are necessary to evaluate integrated technologies, representative modes or prototype systems in a high fidelity and realistic operating environment.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force	Date: May 2021
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Appropriation/Budget Activity 3600: Research, Development, Test & Evaluation, Air Force I BA 4: Advanced Component Development & Prototypes (ACD&P)	R-1 Program Element (Number/Name) PE 0901410F I Contracting Information Technology System
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B. Program Change Summary (\$ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Previous President's Budget	20.830	8.662	20.648	0.000	20.648
Current President's Budget	22.266	5.662	20.343	0.000	20.343
Total Adjustments	1.436	-3.000	-0.305	0.000	-0.305
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	-3.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	2.000	0.000			
• SBIR/STTR Transfer	-0.564	0.000			
• Other Adjustments	0.000	0.000	-0.305	0.000	-0.305

Change Summary Explanation

FY20 - \$2M BTR (initiated during FY20 prior to FY21 mark); \$564K SBIR Transfer

FY21 - \$3M Congressional Reduction

C. Accomplishments/Planned Programs (\$ in Millions)	FY 2020	FY 2021	FY 2022
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Title: CON-IT System Development	22.266	5.662	20.343
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Description: Agile software development and deployment activities that enhance the CON-IT Government-off-the-Shelf contract management system and provide a holistic capability solution to replace four legacy contract writing systems and six support systems. Development efforts are phased into 5 major capability increments according to various user base requirements organized by contracting community (i.e., Base Operations Contracting, Contingency Operations Contracting, Weapon Systems Contracting, R&D Contracting, and Logistics). This enables discrete transitions from the various legacy systems to CON-IT.

FY 2021 Plans:

Commence Capability 2 development by addressing weapons systems contracting, R&D contracting, and Business Intelligence requirements. Unlike previous initiatives under the overarching development effort, these capabilities are much larger and more complex. Baseline code and processes already existed for Capability 1 requirements; efforts consisted of modifying baseline to DAF needs. Capability 2 initiatives require extensive FAR/DFAR research to program and ensure compliance. This initiative has been organized into 27 projects (i.e., agile epics). As development progresses, CON-IT will incrementally deliver to 91 weapon system and R&D sites totaling 3,000 users.

Anticipate delivering 4 of the 27 projects, to include developing:

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force	Date: May 2021
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Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 0901410F / <i>Contracting Information Technology System</i>
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C. Accomplishments/Planned Programs (\$ in Millions)	FY 2020	FY 2021	FY 2022
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- the ability to simultaneously develop and award multiple modifications on a single contract to support offices that use large contracts with multiple buyers working concurrently (i.e., concurrent modifications).

- the ability to manage more complex contract line item number (CLIN) structures for more robust pricing of individual tasks.

- enhanced pricing arrangements that are compliant with all mandated regulations and data schema (PDS).

- the ability to award undefinitized contract actions to include the ability to modify and definitize them to support rapid contracting response for real world issues and provide better pricing opportunity for long lead procurements.

Anticipate delivery to 14 of the 91 weapon system and R&D sites totaling 200 users by the end of FY21.

FY 2022 Plans:
Will finalize the weapon systems contracting and R&D contracting development initiatives within Capability 2. Funding supports increased development velocity to develop the minimum viable products for the remaining 23 of 27 vital projects that will enable deployment to the remaining weapon system and R&D sites (2,800 users).

Development initiatives will include but not be limited to the following:

- Will enable administrative contracting officers (ACOs) to award administrative modifications within CON-IT.
- Will award grants and other transaction authority devices to include the use of articles to support non-FAR based transactions; this enables increased partnership with universities and industry.
- Will improve transaction integrity and security with the implementation of digital signatures.
- Will automate the incorporation of clause updates prior to award.
- Will assign contract numbers early in the acquisition process to link documentation to the actual contract number and allow for earlier reviews.
- Will add capability to create lease type agreements.
- Will automate the data transmission of customer requirements from various DAF financial systems into CON-IT.
- Will automate the data exchange of contract data with AF accounting systems instead of requiring manual entry that can delay contractor payments.
- Will automate the solicitation process with the business opportunity website to allow contractor bids to populate the system automatically instead of manually loading proposal information.

Will begin planning development activities for Capability 2 - Logistics contracting community (1,200 users).

FY 2021 to FY 2022 Increase/Decrease Statement:

FY 2020	FY 2021	FY 2022

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force	Date: May 2021
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Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 0901410F / <i>Contracting Information Technology System</i>
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C. Accomplishments/Planned Programs (\$ in Millions)	FY 2020	FY 2021	FY 2022
Funding has increased from FY21 to FY22 to complete remaining development on 85% of projects and 78% of weapons systems. This increase will facilitate availability for all 3,000 users.			
Accomplishments/Planned Programs Subtotals	22.266	5.662	20.343

D. Other Program Funding Summary (\$ in Millions)

N/A

Remarks

E. Acquisition Strategy

The CON-IT acquisition strategy aligns with the Secretary of Defense's (OSD) Defense Procurement Acquisition Policy strategy for procurement systems. The program automates the entire business process, implements data standards set by OSD across the AF contracting community, consolidates 10 legacy systems into one, reuses Government-off-the-Shelf solutions, and employs agile software development methods (a best practice from industry).

Each of the 5 aforementioned major capabilities are developed, deployed, and enhanced using agile software development methods enabling strategic sourcing and other acquisition efficiencies by standardizing data, business rules, and milestone tracking. Development activities consist of an iterative process of three-week sprint development cycles, each culminating in deploying capability to DAF users. This allows the program to deliver early capability to the end users, achieve early return on investment of taxpayer dollars, mitigate risk, reduce waste, effectively respond to change, and continuously improve processes.

Built upon the Defense Information Systems Agency's Integrated Defense Enterprise Acquisition System contract writing system, CON-IT is a Government-off-the-Shelf product running on a Commercial Off-the-Shelf platform, Appian Business Process Management. Through an interagency agreement, the DAF partnered with the United States Department of Agriculture's (USDA) Enterprise Application Services (EAS) team to develop, test, validate, deploy, and maintain CON-IT. Data Center Hosting Services, managed and operated by the Digital Infrastructure Services Center, provides and maintains the development and production environments in the USDA Enterprise Data Centers.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0901410F / Contracting Information Technology System	Project (Number/Name) 643483 / CON-IT
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Product Development (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
CON IT: Prime Developer/ Systems Integrator	MIPR	Contracting Information : Wright Patterson AFB, OH	-	14.276	Oct 2019	2.968	Oct 2020	12.266	Dec 2021	-		12.266	-	-	29.510
Subtotal			-	14.276		2.968		12.266		-		12.266	-	-	N/A

Remarks
Interagency agreement with USDA (United States Department of Agriculture)

Test and Evaluation (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
CON-IT Functional/ Automation Quality Assurance from USDA	MIPR	Various : Various	-	3.569	Oct 2019	0.742	Oct 2020	3.067	Dec 2021	-		3.067	-	-	7.378
Subtotal			-	3.569		0.742		3.067		-		3.067	-	-	N/A

Remarks
USDA: United States Department of Agriculture

Management Services (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
CON-IT: Program Management Administration, Cost Estimating Support, Travel, Supplies, Equipment, Program Office Network	Various	AFLCMC/HIBB : WPAFB, OH	-	4.421	Oct 2019	1.952	Oct 2020	5.010	Dec 2021	-		5.010	-	-	11.383
Subtotal			-	4.421		1.952		5.010		-		5.010	-	-	N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0901410F / Contracting Information Technology System	Project (Number/Name) 643483 / CON-IT
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Management Services (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total		Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost				

Remarks
 A&AS: Advisory & Assistance Services
 Multiple contract awards for less than \$1M per award

	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	-	22.266	5.662	20.343	-	20.343	-	-	N/A

Remarks

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Exhibit R-4A, RDT&E Schedule Details: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0901410F / <i>Contracting Information Technology System</i>	Project (Number/Name) 643483 / <i>CON-IT</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
CON-IT Program Milestones				
Capability 2: Weapon Systems Limited Deployment	1	2020	2	2020
CON-IT Capability Development Activities				
Capability 2: Development, Test, and Deployment of Weapon System/R&D Capability/ Business Intelligence	4	2020	4	2022

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 1203164F / <i>NAVSTAR Global Positioning System (User Equipment) (SPACE)</i>
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COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
Total Program Element	1,292.024	308.215	0.000	0.000	0.000	0.000	-	-	-	-	-	-
643833: <i>MILITARY GLOBAL POSITIONING SYSTEM USER EQUIP</i>	1,292.024	308.215	0.000	0.000	0.000	0.000	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-	-	-

Program MDAP/MAIS Code: 447

A. Mission Description and Budget Item Justification

Note: "NAVSTAR" will be removed from the program title in this Budget Line Item in the next budget submission.

In FY2021, PE 1203164F, NAVSTAR Global Positioning System (User Equipment) efforts were transferred to Appropriation 3620, Research, Development, Test & Evaluation (RDT&E), Space Force, PE 1203164SF NAVSTAR Global Positioning System (User Equipment) from Appropriation 3600, Budget Activity 04, due to the creation of a new Appropriation for Space Force.

The Global Positioning System (GPS) is a space-based radio Positioning, Navigation, and Timing (PNT) distribution system. GPS User Equipment (UE) consists of standardized receivers, antennas, antenna electronics, and other related equipment, grouped together in sets to derive navigation and time information transmitted from GPS satellites. These receiver sets are used by the Department of Defense (DoD). RDT&E funds UE development, integration, test, and analysis for new PNT receiver capabilities in Navigation Warfare (NAVWAR) across all military platforms using GPS services.

The Military Global Positioning System User Equipment (MGUE) Increment (Inc) 1 program is responsible for the development of standard modernized receiver form factors for the Service-nominated lead platforms. The MGUE Inc 1 Capability Development Document (CDD) was approved by the Joint Requirements Oversight Council (JROC) on 24 July 2014. MGUE Inc 1 is initiating a new family of modernized GPS receivers that will deliver significantly improved capability to counter current and emerging PNT threats and enable military operations in a NAVWAR environment where current legacy receiver performance would be compromised. MGUE Inc 1 received a Milestone A decision in April 2012. The program received direction in February 2014, from the Under Secretary of Defense for Acquisition, Technology, and Logistics (USD(AT&L)) to execute a new acquisition strategy, accelerating the program to provide test units faster to facilitate military end users. The MGUE program received a Milestone B decision in January 2017.

The MGUE Inc 2 effort will continue to expand Military-Code (M-Code) receiver technology into additional applications (space receivers and precision guided munitions), and develop a modernized Handheld device to meet Service requirements. This effort leverages the MGUE Inc 1 technology to the maximum extent while addressing the production of M-Code integrated circuits far into the future. The MGUE Inc 2 program is being executed in three parts: 1) Risk Reduction Activities, 2) Miniature Serial Interface (MSI) Receiver Card Middle Tier Acquisition rapid prototyping, and 3) Joint Modernized GPS Handheld Receiver Middle Tier Acquisition rapid prototyping effort. The JROC approved the MGUE Inc 2 CDD on 6 April 2018. The Air Force Service Acquisition Executive approved the MGUE Inc 2 Acquisition

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force	Date: May 2021
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Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 1203164F / NAVSTAR Global Positioning System (User Equipment) (SPACE)
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Strategy to include designation of two Middle Tier Acquisition Rapid Prototype efforts: 1) Miniature Serial Interface (MSI) Receiver Cards to include next-generation Application Specific Integrated Circuit (ASIC) and 2) Joint, Modernized Handheld Receiver.

Space acquisition must respond with speed and agility to emerging adversary threats. Space & Missile Systems Center (SMC) has transformed the organization and implementation of space acquisition to an enterprise approach, maximizing innovation and resiliency, leveraging international, commercial, and mission partnerships, and managing program/project priorities according to an integrated unclassified/classified enterprise space architecture. Expanding the appropriate acquisition authorities and contract mechanisms to deliver capability sooner, SMC will strategically execute experimentation, prototyping, risk reduction, and other efforts to develop new or repurpose capabilities.

This Program Element (PE) may include necessary civilian pay expenses required to manage, execute, and deliver MGUE weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in PEs 1206392F and 1206398F.

This effort is in Budget Activity 4, Advanced Component Development and Prototypes (ACD&P), because efforts are necessary to evaluate integrated technologies, representative modes or prototype systems in a high fidelity and realistic operating environment.

B. Program Change Summary (\$ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Previous President's Budget	320.598	0.000	0.000	0.000	0.000
Current President's Budget	308.215	0.000	0.000	0.000	0.000
Total Adjustments	-12.383	0.000	0.000	0.000	0.000
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	-1.705	0.000			
• SBIR/STTR Transfer	-10.678	0.000			
• Other Adjustments	0.000	0.000	0.000	0.000	0.000

Change Summary Explanation

FY 2020: -1.750M Decrease for higher Air Force Space priorities

C. Accomplishments/Planned Programs (\$ in Millions)	FY 2020	FY 2021	FY 2022
Title: MGUE Inc 1	77.845	-	-
Description: The MGUE Inc 1 program develops standard modernized receiver form factors for the Service-nominated lead platforms in accordance with the MGUE Inc 1 CDD.			

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600: Research, Development, Test & Evaluation, Air Force I BA 4: Advanced Component Development & Prototypes (ACD&P)	R-1 Program Element (Number/Name) PE 1203164F I NAVSTAR Global Positioning System (User Equipment) (SPACE)
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C. Accomplishments/Planned Programs (\$ in Millions)	FY 2020	FY 2021	FY 2022
<p>Title: Advanced Technology</p> <p>Description: Advanced Technology includes efforts to mature technology for future GPS receivers called out in the MGUE CDDs. These efforts aim to find innovative solutions to increase resiliency in GPS performance and improve on size, weight, power, and cost (SWAP/C) of military receivers.</p>	8.000	-	-
<p>Title: System/Platform Integration and Performance Certification</p> <p>Description: Integration of MGUE Inc 1 receiver form factors into the Service-nominated lead platforms in support of developmental and operational test events. Conduct technical and operational modernization impact analysis for MGUE Service lead platform integration.</p>	47.258	-	-
<p>Title: Information Assurance, Security/Compatibility Certification, and Test/Evaluation</p> <p>Description: Develop, implement, and maintain GPS security certification programs. Development of DoD Policy, strategy and resource requirements for MGUE security certification and compatibility certification. Security certification, compatibility certification, and security approval ensures future military GPS receivers protect critical program information and continue working in all environments and concepts of operations called for by U.S. Strategic Command.</p>	3.302	-	-
<p>Title: MGUE Inc 2 Risk Reduction</p> <p>Description: The MGUE Inc 2 program will develop M-Code receiver technology for additional applications (space receivers, precision guided munitions, and handheld receivers) to meet Service requirements. MGUE Inc 2 Risk Reduction activities include, but are not limited to, acquisition strategy development, early design efforts through Preliminary Design Review (PDR) for the next generation ASIC using 14nm ASIC technology node, handheld design activities and early user demonstrations, advanced concept studies, receiver component prototyping to include MGUE Inc 2 requirements.</p>	171.810	-	-
Accomplishments/Planned Programs Subtotals	308.215	-	-

D. Other Program Funding Summary (\$ in Millions)

Line Item	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
• SPAF 01 GPSSPC: Navstar GPS Space	0.000	-	-	-	-	-	-	-	-	-	-

Remarks
Space Procurement, Air Force (SPAF) funding in this PE supports legacy SAASM efforts. Similar work for the MGUE is in the planning phase.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force Date: May 2021

Appropriation/Budget Activity 3600: Research, Development, Test & Evaluation, Air Force I BA 4: Advanced Component Development & Prototypes (ACD&P)	R-1 Program Element (Number/Name) PE 1203164F I NAVSTAR Global Positioning System (User Equipment) (SPACE)
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E. Acquisition Strategy

The MGUE program has developed a comprehensive acquisition strategy to provide modernized GPS capabilities to U.S. and Allied Forces by developing a competitive market driven approach. This strategy establishes the signal compatibility and security criteria along with a process for evaluating components to enable rapid movement from development to fielding. The pillars of this effort are: (a) establishing time certain and low risk development; (b) bounding requirements to leverage mature technology to the maximum extent possible; (c) focusing on the development of form factors based on well-defined standards to support lead platform integration; and (d) implementing a proactive, collaborative MGUE platform integration activity to mitigate risk and reduce cost for DoD force structure modernization.

The MGUE program awarded three sole source contracts for the Inc 1 Technology Development Phase effort in September 2012, as follow-on efforts to the competitively awarded Modernized User Equipment (MUE) contracts awarded in June 2006. The effort spans the Technology Maturation and Risk Reduction Phase through design and includes integration and test of M-Code receivers into Service-nominated lead platforms. This effort also includes the security and compatibility certification of GPS receiver cards as a part of the integration effort. The Service lead platforms will select from the available vendors to integrate and perform operational testing with funding from the MGUE program. This supports compliance with PL 111-383, section 913.

The MGUE Inc 2 program developed an Acquisition Strategy to continue MGUE development by: addressing long term producibility of MGUE ASICs, identifying a U.S. owned trusted foundry for ASIC development, delivering GPS receiver cards to meet stringent Inc 2 requirements, and developing a modernized GPS handheld receiver to meet the needs of the Services. The MGUE Inc 2 program is being executed in three parts: 1) Risk Reduction Activities, 2) MSI Middle Tier Acquisition rapid prototyping, and 3) Joint Modernized GPS Handheld Receiver Middle Tier Acquisition rapid prototyping effort. The Air Force Service Acquisition Executive approved the MGUE Inc 2 Acquisition Strategy to include designation of two Middle Tier Acquisition Rapid Prototype efforts: 1) Miniature Serial Interface Receiver Card (includes next-generation ASIC) and 2) Joint, Modernized Handheld Receiver.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 1203164F / NAVSTAR Global Positioning System (User Equipment) (SPACE)	Project (Number/Name) 643833 / MILITARY GLOBAL POSITIONING SYSTEM USER EQUIP
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Product Development (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
MGUE Inc 1 Technology Development (1)	C/CPIF	Collins Aerospace : Cedar Rapids, IA	146.703	18.610	Nov 2019	-		-		-		-	-	-	167.971
MGUE Inc 1 Technology Development (2)	C/CPIF	Raytheon : El Segundo, CA	194.016	27.539	Nov 2019	-		-		-		-	-	-	211.320
MGUE Inc 1 Technology Development (3)	C/CPIF	L3Harris Tech : Anaheim, CA	107.300	5.000	Nov 2019	-		-		-		-	-	-	120.189
MGUE Inc 1 Pre-Tech Development	Various	Various : Various	59.880	8.000	Jan 2020	-		-		-		-	-	-	-
MGUE Inc 1 Demos	Various	Various : TBD	0.000	-		-		-		-		-	-	-	-
MGUE Inc 1 Platform Integration	Various	Various : Various	211.671	30.560	Nov 2019	-		-		-		-	-	-	-
MGUE Inc 1 Compatibility Certification	Various	Various : Various	11.158	-		-		-		-		-	-	-	-
MGUE Inc 1 Information Assurance	Various	Various : Various	23.217	2.678	Jan 2020	-		-		-		-	-	-	-
MGUE Inc 1 Security Certification	Various	Various : Various	32.913	0.000	Jan 2020	-		-		-		-	-	-	-
MGUE Inc 1 Technical Mission Analysis	MIPR	Various : El Segundo, CA	60.248	11.539	Oct 2019	-		-		-		-	-	-	-
MGUE Inc 1 Enterprise SE&I	Various	SAIC : El Segundo, CA	102.734	18.392	Nov 2019	-		-		-		-	-	-	132.525
MGUE Inc 2 Risk Reduction	Various	Various : Various	195.630	156.974	Jan 2020	-		-		-		-	-	-	1,013.400
MGUE Inc 2 Technical Mission Analysis	MIPR	Various : El Segundo, CA	2.466	5.500	Oct 2019	-		-		-		-	-	-	-
MGUE Inc 2 Enterprise SE&I	Various	SAIC : El Segundo, CA	2.000	5.215	Nov 2019	-		-		-		-	-	-	97.300
Subtotal			1,149.936	290.007		-		-		-		-	-	-	N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 1203164F / NAVSTAR Global Positioning System (User Equipment) (SPACE)	Project (Number/Name) 643833 / MILITARY GLOBAL POSITIONING SYSTEM USER EQUIP
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Test and Evaluation (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
MGUE Inc 1 Test and Evaluation	Various	Various : San Diego, CA	19.591	3.733	Jan 2020	-		-		-		-	-	-	-
Subtotal			19.591	3.733		-		-		-		-	-	-	N/A

Management Services (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
MGUE Inc 1 FFRDC	Various	Aerospace/MITRE : Various	57.502	6.735	Dec 2019	-		-		-		-	-	-	-
MGUE Inc 2 FFRDC	Various	Aerospace/MITRE : Various	0.000	1.639	Jan 2020	-		-		-		-	-	-	-
MGUE Inc 1 A&AS	Various	Various : Various	54.014	3.469	Dec 2019	-		-		-		-	-	-	-
MGUE Inc 2 A&AS	Various	Various : Various	8.850	2.332	Jan 2020	-		-		-		-	-	-	-
MGUE Inc 1 and Inc 2 Other Support	Various	Various : Various	2.131	0.300	Oct 2019	-		-		-		-	-	-	-
Subtotal			122.497	14.475		-		-		-		-	-	-	N/A

	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	1,292.024	308.215	0.000	-	-	-	-	-	N/A

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 1203164F / NAVSTAR Global Positioning System (User Equipment) (SPACE)	Project (Number/Name) 643833 / MILITARY GLOBAL POSITIONING SYSTEM USER EQUIP

FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

MGUE Increment 1	
MGUE Inc 1 Developmental Test*	
MGUE Increment 2	
MGUE Inc 2 Next-Gen ASIC Studies up to PDR	
MGUE Inc 2 Handheld Risk Reduction Activities/Prototypes	

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Exhibit R-4A, RDT&E Schedule Details: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 1203164F / NAVSTAR Global Positioning System (User Equipment) (SPACE)	Project (Number/Name) 643833 / MILITARY GLOBAL POSITIONING SYSTEM USER EQUIP

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
MGUE Increment 1				
MGUE Inc 1 Developmental Test*	1	2020	4	2020
MGUE Increment 2				
MGUE Inc 2 Next-Gen ASIC Studies up to PDR	1	2020	4	2020
MGUE Inc 2 Handheld Risk Reduction Activities/Prototypes	1	2020	4	2020

Note

All 5 form factors will go through some form of Developmental Test. Per the MGUE Inc 1 Acq Strategy however, only the first card of each variant (GB-GRAM-M/GRAM-S/M) will go through formal Operational Test. OT could/would complete on the "first card" while other form factors continue to go through DT.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 1203710F / <i>EO/IR Weather Systems</i>
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COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
Total Program Element	-	121.723	0.000	0.000	0.000	0.000	-	-	-	-	-	-
643730: <i>EO/IR Weather System Dev</i>	-	121.723	0.000	0.000	0.000	0.000	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-	-	-

A. Mission Description and Budget Item Justification

In FY 2021, PE 1203710F, EO/IR Weather Systems efforts were transferred to Appropriation 3620, Research, Development, Test & Evaluation, Space Force, PE 1203710SF, EO/IR Weather Systems from Appropriation 3600, Budget Activity 04 due to the creation of a new Appropriation for Space Force.

In compliance with 2016 National Defense Authorization Act (NDAA) and Joint Requirements Oversight Council (JROC) Memo 062-17, dated 20 Jun 2017, the Air Force has decided to pursue a materiel solution to address Space-based Environmental Monitoring (SBEM) weather Gap 1 - Cloud Characterization (CC) and Gap 2 - Theater Weather Imagery (TWI) as a follow-on to Defense Meteorological Satellite Program (DMSP) operational constellation. The Department of Defense (DoD) requires continued global collection of CC and TWI data to contribute to the space domain awareness. Without the CC and TWI data, AF production of global predictive weather data would be severely impacted, affecting daily air operations and intelligence gathering for strategic mission planning, especially around the contested environment. Electro-Optical/Infrared (EO/IR) Weather Systems (EWS) is a component of JROC-approved SBEM materiel solution specifically designed to address CC and TWI needs post-DMSP mission end of life.

Based on recently completed SBEM Capability Assessment and Strategy Review (CASR) in April 2019, the current EWS acquisition strategy pivots focuses on a distributed LEO architecture, for scalability and increased operational resilience. The Air Force will pursue prototyping of latest industry capabilities for simplified sensor designs, while meeting CC and TWI requirements and data latencies in a distributed architecture. The EWS prototyping effort will:

- 1) Explore low-Size, Weight & Power/simplified EO/IR sensor designs in highly competitive design sprints, utilizing variety of experimental/prototyping contract vehicles
- 2) Conduct system technology end-to-end demonstration, from prototype build, Integration & Test, Launch, ground Telemetry/Tracking & Commanding (TT&C) and on-orbit data collection to data processing and dissemination to the Weather Centrals
- 3) Explore business models for the feasibility of commercially available data

In addition, the program may integrate sensors into a commercial & Government communication transport layer, leveraging web services to ensure delivery of data products to end users.

Secondary investments may be supported to address weather gaps identified in the SBEM Analysis of Alternatives and validated by the JROC.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 1203710F / <i>EO/IR Weather Systems</i>
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Space acquisition must respond with speed and agility to emerging adversary threats. Space & Missile Systems Center (SMC) has transformed the organization and implementation of space acquisition to an enterprise approach, maximizing innovation and resiliency, leveraging international, commercial, and mission partnerships, and managing program/project priorities according to an integrated unclassified/classified enterprise space architecture. Expanding the appropriate acquisition authorities and contract mechanisms to deliver capability sooner, SMC will strategically execute experimentation, prototyping, risk reduction, and other efforts to develop new or repurpose capabilities.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver EWS weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program elements 1206392F and 1206398F.

This effort is in Budget Activity 4, Advanced Component Development and Prototypes (ACD&P), because efforts are necessary to evaluate integrated technologies, representative modes or prototype systems in a high fidelity and realistic operating environment.

B. Program Change Summary (\$ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Previous President's Budget	125.964	0.000	0.000	0.000	0.000
Current President's Budget	121.723	0.000	0.000	0.000	0.000
Total Adjustments	-4.241	0.000	0.000	0.000	0.000
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	-4.241	0.000			
• Other Adjustments	0.000	0.000	0.000	0.000	0.000

Congressional Add Details (\$ in Millions, and Includes General Reductions)

Project: 643730: *EO/IR Weather System Dev*

Congressional Add: *Transfer from SpRCO (Line 72)*

Congressional Add Subtotals for Project: 643730

Congressional Add Totals for all Projects

	FY 2020	FY 2021
	24.742	-
	24.742	-
	24.742	-

Change Summary Explanation

FY 2020: +24.742M: Congressional add for transfer from line 72 (SpRCO)

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force	Date: May 2021
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Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 1203710F / <i>EO/IR Weather Systems</i>
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C. Accomplishments/Planned Programs (\$ in Millions)	FY 2020	FY 2021	FY 2022
<p>Title: Electro-Optical/Infrared Weather System (EWS)</p> <p>Description: Description: EWS will pursue multi-phase efforts utilizing rapid experimental/prototype contract vehicles to mature industry EO/IR technologies to provide global LEO coverage to meet SBEM Gaps 1 (CC) and 2 (TWI) and eventual on-ramp to operational EO/IR system to replace DMSP constellation. Space Enterprise Consortium (SpEC) Other Transaction (OT) #1 is the prototyping effort, which will focus on maturing multi-spectral imaging capabilities to collect & disseminate terrestrial atmospheric phenomena to support DoD operations, while assessing industrial capabilities to provide CC and TWI data in a viable commercial business model. The program will pursue simplified sensor designs and corresponding lower size, weight and power prototypes potentially hosted on a proliferated LEO mesh network. To minimize risks associated with rapid prototyping effort to replace DMSP constellation, SpEC OT #2 will focus on further developing high maturity EO/IR system designs in competitive design sprints in a parallel path to SpEC OT #1. This path will provide viable on-ramp opportunity to field operational EO/IR system, should prototype demonstrations prove unsuccessful.</p> <p>FY 2021 Plans: N/A</p> <p>FY 2022 Plans: N/A</p>	96.981	0.000	0.000
Accomplishments/Planned Programs Subtotals	96.981	0.000	0.000

	FY 2020	FY 2021
Congressional Add: Transfer from SpRCO (Line 72)	24.742	-
FY 2020 Accomplishments: Transfer from Line 72 for EO/IR prototyping effort		
Congressional Adds Subtotals	24.742	-

D. Other Program Funding Summary (\$ in Millions)
N/A

Remarks

E. Acquisition Strategy
The acquisition strategy for EWS is based on validated SBEM CASR recommendations, JROC Memoranda, and subsequent architectural analysis for future weather needs. EWS will initially pursue competitive bids to field technology demonstration EO/IR prototype system capable of fulfilling CC and TWI. Once technology demonstrations of the prototype system has proven successful, the EWS program will transition to fielding operational systems capable of meeting CC and TWI requirements.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 1203710F / <i>EO/IR Weather Systems</i>	
<p>Phase I will leverage ongoing experimental EO/IR prototype development projects under AFRL's SBIR contracts to understand operational utility of available and developing EO/IR sensors.</p> <p>Phase II SpEC OT #1 will involve competitive bids for multiple system designs using SpEC OT contracts for rapid prototyping effort to fulfill CC and TWI requirements, while exploring valid commercial business models for industry to provide weather data as a service.</p> <p>In order to minimize risks to DMSP constellation coverage, the Air Force will also pursue SpEC OT #2 for risk mitigation, pursuing competitive bid on low- risk, high-maturity system-level solutions in a parallel effort to the prototyping effort, that can fully address CC and TWI requirements as part of the Family of Systems comprised of civil and International partnerships. This risk mitigation option will carry two vendors to PDR level design and include assessment of prototype system performance and potential for transition to operations.</p> <p>Following the acquisition strategy approval and assessment of the simplified sensors' performance with the AF weather mission, the AF plans to assess costs to ramp production in future phase III to reduce revisit time to maximize warfighter utility.</p>		

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 1203710F / EO/IR Weather Systems	Project (Number/Name) 643730 / EO/IR Weather System Dev
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Product Development (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Phase I	C/CPAF	AFRL : Fairfax, VA	-	5.100	Feb 2020	-		-		-		-	-	-	-
Phase II	C/Various	Various : Various, CA	-	103.587	Apr 2020	-		-		-		-	-	-	-
Phase II Risk Mitigation	MIPR	NASA : TBD	-	3.031	Aug 2020	-		-		-		-	-	-	-
Technical Mission Analysis	RO	Aerospace Corp : El Segundo, CA	-	1.466	Jan 2020	-		-		-		-	-	-	-
Enterprise Systems Engineering & Integration	C/CPIF	Engility Corp : Andover, MA	-	1.606	Mar 2020	-		-		-		-	-	-	-
Subtotal			-	114.790		-		-		-		-	-	-	N/A

Management Services (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
FFRDC	RO	Aerospace Corp : El Segundo, CA	-	2.851	Apr 2020	-		-		-		-	-	-	-
A&AS	Various	Various : Various	-	3.971	Mar 2020	-		-		-		-	-	-	-
Other Support	Various	Various : Various	-	0.111	Jun 2020	-		-		-		-	-	-	-
Subtotal			-	6.933		-		-		-		-	-	-	N/A

Project Cost Totals	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
	-	121.723	0.000	-	-	-	-	-	N/A

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 1203710F / <i>EO/IR Weather Systems</i>	Project (Number/Name) 643730 / <i>EO/IR Weather System Dev</i>
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FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

<i>EO/IR Weather Systems (EWS)</i>	
EWS Phase I Weather Satellite	
EWS Phase II Spec OT #1 System Prototype Solicitation Dev & Award	
EWS Phase II SpEC OT #1 System Prototype Design	

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Exhibit R-4A, RDT&E Schedule Details: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 1203710F / <i>EO/IR Weather Systems</i>	Project (Number/Name) 643730 / <i>EO/IR Weather System Dev</i>
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Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>EO/IR Weather Systems (EWS)</i>				
EWS Phase I Weather Satellite	2	2020	4	2020
EWS Phase II Spec OT #1 System Prototype Solicitation Dev & Award	1	2020	2	2020
EWS Phase II SpEC OT #1 System Prototype Design	2	2020	4	2020

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 1206422F / <i>Weather System Follow-on</i>
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COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
Total Program Element	497.869	195.495	0.000	0.000	0.000	0.000	-	-	-	-	-	-
644289: <i>Weather System Follow-On</i>	497.869	195.495	0.000	0.000	0.000	0.000	-	-	-	-	-	-

Program MDAP/MAIS Code: 488

A. Mission Description and Budget Item Justification

In FY2021, PE 1206422F, Weather System Follow-On efforts were transferred to Appropriation 3620, Research, Development, Test & Evaluation, Space Force, PE 1206422SF Weather System Follow-On from Appropriation 3600, Budget Activity 04 due to the creation of a new Appropriation for Space Force.

In FY2021, PE 1206422F, Military Application of the Space Environment efforts were transferred to PE 1206427F, Appropriation 3620, Research, Development, Test & Evaluation, Space Force, Budget Activity 04 due to the creation of a new Appropriation for Space Force.

Based on completion of the Space-Based Environmental Monitoring (SBEM) Joint Requirements Oversight Council (JROC) Memo 092-14, capabilities will be developed to satisfy weather gaps for which no known mitigation exists. Weather System Follow-on (WSF) is a component of SBEM efforts to develop capabilities to satisfy weather Gap 3 Ocean Surface Vector Winds (OSVW), Gap 8 Tropical Cyclone Intensity (TCI), and Gap 11 Low Earth Orbit (LEO) Energetic Charged Particles (LEO ECP). Gap 3 OSVW and Gap 8 TCI require a space-based microwave sensor to provide polarimetric ocean surface wind direction and speed required for naval sea operations, as well as fighter sortie generations and marine amphibious operations. Gap 11 LEO ECP requires in situ ECP sensor for space situational awareness. The earliest possible launch options are being integrated in the design for critical gaps.

DoD established WSF as a Pre-Major Defense Acquisition Program (MDAP) with the Air force as the lead component. Based on the SBEM AoA results, the WSF initial thrusts will be to enable:

- 1) DoD use of data collected by civil, international and other DoD space systems;
- 2) Timely weather collection over broad oceans in support of maneuvering forces;
- 3) Space weather capabilities to characterize operational orbits, space situational awareness, and the ionosphere.

Secondary investments may be supported to address weather gaps identified in the SBEM AoA and validated by the JROC.

The Military Application of the Space Environment (MASE) is a program to demonstrate mature space environment technology to improve combat operations. MASE will enhance regional ionospheric specification (nowcasts) and predictions (forecasts) affecting signal propagation paths. MASE uses traditional and non-traditional ionospheric measurements in advanced space environment models to forecast and predict impacts to weapon systems. Contributes to satisfying Gaps 4 and 7 of the SBEM AoA results as supplemented by the AFRDM 02-17-02 (SBEM JDCR). MASE was a new start in FY 2019.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force	Date: May 2021
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Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 1206422F / <i>Weather System Follow-on</i>
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Space acquisition must respond with speed and agility to emerging adversary threats. Space & Missile Systems Center (SMC) has transformed the organization and implementation of space acquisition to an enterprise approach, maximizing innovation and resiliency, leveraging international, commercial, and mission partnerships, and managing program/project priorities according to an integrated unclassified/classified enterprise space architecture. Expanding the appropriate acquisition authorities and contract mechanisms to deliver capability sooner, SMC will strategically execute experimentation, prototyping, risk reduction, and other efforts to develop new or repurpose capabilities.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver WSF weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program elements 1206392F and 1206398F.

This effort is in Budget Activity 4, Advanced Component Development and Prototypes (ACD&P), because efforts are necessary to evaluate integrated technologies, representative modes or prototype systems in a high fidelity and realistic operating environment.

B. Program Change Summary (\$ in Millions)	<u>FY 2020</u>	<u>FY 2021</u>	<u>FY 2022 Base</u>	<u>FY 2022 OCO</u>	<u>FY 2022 Total</u>
Previous President's Budget	205.660	0.000	0.000	0.000	0.000
Current President's Budget	195.495	0.000	0.000	0.000	0.000
Total Adjustments	-10.165	0.000	0.000	0.000	0.000
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	-3.013	0.000			
• SBIR/STTR Transfer	-7.152	0.000			
• Other Adjustments	0.000	0.000	0.000	0.000	0.000

Change Summary Explanation

FY2020: -\$3.013M transferred for higher AF priorities.

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force										Date: May 2021		
Appropriation/Budget Activity 3600 / 4					R-1 Program Element (Number/Name) PE 1206422F / <i>Weather System Follow-on</i>				Project (Number/Name) 644289 / <i>Weather System Follow-On</i>			
COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
644289: <i>Weather System Follow-On</i>	497.869	195.495	0.000	0.000	0.000	0.000	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-	-	-

A. Mission Description and Budget Item Justification

Based on completion of the Space-Based Environmental Monitoring (SBEM) Joint Requirements Oversight Council (JROC) Memo 092-14, capabilities will be developed to satisfy weather gaps for which no known mitigation exists. Weather System Follow-on (WSF) is a component of SBEM efforts to develop capabilities to satisfy weather Gap 3 Ocean Surface Vector Winds (OSVW), Gap 8 Tropical Cyclone Intensity (TCI), and Gap 11 Low Earth Orbit (LEO) Energetic Charged Particles (LEO ECP). Gap 3 OSVW and Gap 8 TCI require a space-based microwave sensor to provide polarimetric ocean surface wind direction and speed required for naval sea operations, as well as fighter sortie generations and marine amphibious operations. Gap 11 LEO ECP requires in situ ECP sensor for space situational awareness. The earliest possible launch options are being integrated in the design for critical gaps.

DoD established WSF as a Pre-Major Defense Acquisition Program (MDAP) with the Air force as the lead component. Based on the SBEM AoA results, the WSF initial thrusts will be to enable:

- 1) DoD use of data collected by civil, international and other DoD space systems;
- 2) Timely weather collection over broad oceans in support of maneuvering forces;
- 3) Space weather capabilities to characterize operational orbits, space situational awareness, and the ionosphere.

Secondary investments may be supported to address weather gaps identified in the SBEM AoA and validated by the JROC.

The Military Application of the Space Environment (MASE) is a program to demonstrate mature space environment technology to improve combat operations. MASE will enhance regional ionospheric specification (nowcasts) and predictions (forecasts) affecting signal propagation paths. MASE uses traditional and non-traditional ionospheric measurements in advanced space environment models to forecast and predict impacts to weapon systems. Contributes to satisfying Gaps 4 and 7 of the SBEM AoA results as supplemented by the AFRDM 02-17-02 (SBEM JDCR). MASE was a new start in FY 2019.

Space acquisition must respond with speed and agility to emerging adversary threats. Space & Missile Systems Center (SMC) has transformed the organization and implementation of space acquisition to an enterprise approach, maximizing innovation and resiliency, leveraging international, commercial, and mission partnerships, and managing program/project priorities according to an integrated unclassified/classified enterprise space architecture. Expanding the appropriate acquisition authorities and contract mechanisms to deliver capability sooner, SMC will strategically execute experimentation, prototyping, risk reduction, and other efforts to develop new or repurpose capabilities.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver WSF weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program elements 1206392F and 1206398F.

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force		Date: May 2021		
Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 1206422F / <i>Weather System Follow-on</i>	Project (Number/Name) 644289 / <i>Weather System Follow-On</i>		
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2020	FY 2021	FY 2022
<p>Title: WSF Microwave Satellite (SV1-2)</p> <p>Description: WSF Microwave Satellite (SV1-2): The Space Force (SF) awarded a contract to Ball Aerospace and Technologies Corp. to develop the WSF - Microwave (WSF-M) Space Vehicle (SV) to meet all three capability gaps. WSF-M SV-2 will be an option to exercise, should SF wish to replenish WSF constellation post-SV-1. SV-2 will be functionally equivalent to SV-1. The WSF-M SV-1 projected Initial Launch Capability (ILC) is FY 2024. Secondary investments may be supported to address weather gaps identified in the SBEM AoA and validated by the JROC.</p> <p>FY 2021 Plans: N/A</p> <p>FY 2022 Plans: N/A.</p>		171.091	0.000	0.000
<p>Title: COWVR Tech Demo</p> <p>Description: The Compact Ocean Surface Wind Vector Radiometer (COWVR) launch objective supports Category A Weather Requirements, as codified in JROC Memo 092-014, providing on-orbit technology demonstration of the new COWVR technology to deliver Weather Gap #3, Ocean Surface Vector Winds (OSVW) and Gap #8, Tropical Cyclone Intensity (TCI). This will be a cooperative mission with NASA for integrating the sensor onto the International Space Station (ISS) as a weather technology demonstration project. The new mission designation for the COWVR launch will be Space Test Program Houston Mission #8 (STP-H8). Demonstrating COWVR technology in the space environment remains an important milestone for the microwave data weather mission in lieu of the ORS-6 cancellation. Unlike ORS-6, COVWR will fly on the ISS and the residual operational capability is not guaranteed as a result. Due to this restructure, the projected COWVR launch will be delayed from FY 2019 to FY 2021.</p> <p>FY 2021 Plans: N/A.</p> <p>FY 2022 Plans: N/A.</p>		14.870	0.000	0.000
<p>Title: ECP</p> <p>Description: Energetic Charged Particles (ECP) will fulfill the Space-based Environmental Monitoring (SBEM) Weather Gap 11 and address the Secretary of the Air Force (SECAF) policy which directs each USAF Satellite Office to plan for and integrate ECP sensors on all pre-Milestone B new satellite acquisitions. To accomplish this requirement, the ECP sensor will be integrated on the WSF-M satellite.</p>		0.534	0.000	0.000

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force	Date: May 2021
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Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 1206422F / <i>Weather System Follow-on</i>	Project (Number/Name) 644289 / <i>Weather System Follow-On</i>
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B. Accomplishments/Planned Programs (\$ in Millions)	FY 2020	FY 2021	FY 2022
<p>Energetic Charged Particle (ECP) Hazard Assessment System (HAS) will be a component of space attack assessment. A commercial sources for Aerospace's ECP-Lite sensor and AFRL's CEASE3 has been established. The ECP sensors will be hosted on international and commercial missions to gain additional flight opportunities, orbital regimes, relationships, and constellation architectures to augment the ECP HAS system with supplemental data.</p> <p>FY 2021 Plans: N/A.</p> <p>FY 2022 Plans: N/A.</p>			
<p>Title: Military Application of the Space Environment (MASE)</p> <p>Description: MASE demonstrates a sensor-to-shooter solution to improve mission effectiveness by providing commanders an operational risk assessment tool. MASE will deliver a capability comprised of weapon system tailored visualizations/decision aids to allow warfighter integration into operational plans and tactics, techniques, and procedures. MASE products and services will be evaluated using quantitative standard measures of performance, effectiveness, and outcome against theater operational requirements.</p> <p>In FY2021, PE 1206422F, MASE efforts were transferred to PE 1206427F, Appropriation 3620, Research, Development, Test & Evaluation, Space Force, Budget Activity 04 due to the creation of a new Appropriation for Space Force.</p> <p>FY 2021 Plans: N/A</p> <p>FY 2022 Plans: N/A.</p>	9.000	0.000	0.000
Accomplishments/Planned Programs Subtotals	195.495	0.000	0.000

C. Other Program Funding Summary (\$ in Millions)
N/A

Remarks

D. Acquisition Strategy
DoD established WSF as a pre-MDAP. The acquisition strategy for WSF is based on validated SBEM AoA results from FY2014 and subsequent acquisition strategy development activities that were conducted in FY 2015. The WSF acquisition strategy focuses on streamlined acquisition process for providing materiel solutions

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 1206422F / <i>Weather System Follow-on</i>	Project (Number/Name) 644289 / <i>Weather System Follow-On</i>
<p>to OSVW, TCI & LEO ECP, as validated by the JROC; deliver microwave sensing solution to address DoD needs for OSVW and TCI capabilities and deliver space environment sensing solution to address LEO ECP capabilities for on-orbit attributions and anomaly resolutions.</p> <p>The Air Force is conducting a technology demonstration of the Compact Ocean Surface Wind Vector Radiometer (COWVR) sensor in partnership with NASA Space Test Program (STP) to launch and integrate with International Space Station (ISS), utilizing their unique technology demonstration capabilities for on-orbit demonstration of COWVR technology. SMC's STP is the leading AF organization spearheading the NASA partnership, while SMC/DCIF is responsible for the COWVR project and funding and providing programmatic support to enable COWVR sensor to ISS integration/technology demonstration.</p> <p>The program awarded a contract for WSF satellite, capable of meeting all three weather capability gaps, in a full and open competition environment, in order to reduce overall program cost. The Air Force is procuring one WSF-M satellite with an option for a second satellite. WSF-M first satellite (SV-1) ILC is FY 2024 to mitigate any potential weather coverage gaps. WSF-M SV-2 ILC is currently projected for FY 2028. The WSF SV-2 will be functionally equivalent to SV-1. Naval Research Lab Blossom Point Tracking Facility (BPTF) will be used as a viable unclassified EGS-compatible SOC for WSF-M. BPTF consists of a satellite mission operations center, multiple ground antennas including via AFSCN, and an existing infrastructure capable of providing space system command, control, and communications (C3).</p> <p>The WSF ECP sensor development will leverage current AFRL sensor and hazard assessment technology to accelerate availability of ECP sensor for integration on WSF-M and other planned AF satellite acquisitions. The AF intends to transition AFRL's technology to industry for production via competitive award. Two Tech Demo ECP sensors are projected to be delivered and ready for satellite integration by FY 2022. Post-Tech Demo ECP phase, each respective program offices will be responsible for the procurement/integration and sustainment of the sensors required to meet the SecAF's Space Situational Awareness (SSA) policy.</p> <p>The program intends to continue research and development at AFRL to support the MASE baseline. Features to enhance and improve MASE related prototypes/models will be added through capability drops while maintaining Risk Management Framework compliance. Award contracts to conduct studies and perform technical analysis for external data sources and optimal sensor laydown, system development and external system integration. Conduct field campaigns to validate scientific algorithms. Provision cloud services, deploy ionospheric ground sensors and provide program office support.</p>		

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 1206422F / <i>Weather System Follow-on</i>	Project (Number/Name) 644289 / <i>Weather System Follow-On</i>
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Product Development (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
COWVR Technology Demonstration	Various	Various : Various	59.132	14.870	Oct 2019	-		-		-		-	-	-	-
WSF Microwave System (SV1-2)	C/FFP	Ball Aerospace : Boulder, CO	182.103	146.058	Nov 2019	-		-		-		-	-	-	-
ECP	Various	Various : Various, NM	6.194	0.534	Mar 2020	-		-		-		-	-	-	-
ECP Prototyping	Various	Various : El Segundo, CA	9.100	0.000		-		-		-		-	-	-	-
MASE	Various	Various : Various, CO	16.242	9.000	Apr 2020	-		-		-		-	-	-	-
Enterprise Systems Engineering & Integration	C/CPIF	Engility Corp. : Andover, MA	8.857	3.970	Dec 2019	-		-		-		-	-	-	-
Technical Mission Analysis	RO	Aerospace Corp : El Segundo, CA	16.483	3.359	Oct 2019	-		-		-		-	-	-	-
Weather Studies (Formerly BAA)	Various	Various : Various, CA	6.489	0.000		-		-		-		-	-	-	-
Ground	MIPR	NRL : Welcome, MD	5.684	6.275	Dec 2019	-		-		-		-	-	-	-
Pre-Acquisition Activities	Various	Various : Various	121.704	0.000		-		-		-		-	-	-	-
Subtotal			431.988	184.066		-		-		-		-	-	-	N/A

Support (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Requirements/Engineering Analysis Support	RO	Defense Information Technical Center : El Segundo, CA	1.543	-		-		-		-		-	-	-	-
Engineering Risk Reduction Studies	Various	Various : Various	1.711	-		-		-		-		-	-	-	-
Subtotal			3.254	-		-		-		-		-	-	-	N/A

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Exhibit R-4, RDT&E Schedule Profile: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 1206422F / <i>Weather System Follow-on</i>	Project (Number/Name) 644289 / <i>Weather System Follow-On</i>
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	FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

	FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
<i>Weather System Follow-On</i>																												
COWVR Technology Demonstration I&T																												
WSF Microwave Ground CDR																												
WSF Microwave System Milestone B																												
WSF SV-1 Production																												
WSF Microwave System CDR																												
WSF ECP Delta CDR																												
WSF Microwave Imaging Integration and Test																												
WSF Microwave Ground Segment Development																												
<i>Military Application of Space Environment</i>																												
MASE Capability Drops																												

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Exhibit R-4A, RDT&E Schedule Details: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 1206422F / <i>Weather System Follow-on</i>	Project (Number/Name) 644289 / <i>Weather System Follow-On</i>
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Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>Weather System Follow-On</i>				
COWVR Technology Demonstration I&T	2	2020	4	2020
WSF Microwave Ground CDR	1	2020	1	2020
WSF Microwave System Milestone B	2	2020	2	2020
WSF SV-1 Production	2	2020	4	2020
WSF Microwave System CDR	2	2020	2	2020
WSF ECP Delta CDR	2	2020	2	2020
WSF Microwave Imaging Integration and Test	3	2020	4	2020
WSF Microwave Ground Segment Development	4	2020	4	2020
<i>Military Application of Space Environment</i>				
MASE Capability Drops	3	2020	4	2020

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 1206425F / <i>Space Situation Awareness Systems</i>
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COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
Total Program Element	-	29.013	0.000	0.000	0.000	0.000	-	-	-	-	-	-
640290: <i>Deep Space Advanced Radar Concept</i>	-	29.013	0.000	0.000	0.000	0.000	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-	-	-

A. Mission Description and Budget Item Justification

In FY 2021, PE 1206425F, Deep Space Advanced Radar Concept efforts were transferred to Appropriation 3620, Research, Development, Test & Evaluation, Space Force, PE 1206425SF Deep Space Advanced Radar Concept from Appropriation 3600, Budget Activity 04 due to the creation of a new Appropriation for Space Force.

Deep Space Advanced Radar Concept (DARC) will leverage ongoing defense science and technology efforts to mature radar concepts and technologies to develop and evaluate prototypes that demonstrate increased sensitivity, capacity, search rates, and scalability to detect, track and maintain custody of objects in deep space orbit. This effort will analyze and select the most promising technologies to move forward into system development and operations and a program of record (PoR). DARC will augment the Space Surveillance Network (SSN) as an additional sensor with increased capacity and capability for deep space object custody at Geosynchronous Earth Orbit (GEO).

Space acquisition must respond with speed and agility to emerging adversary threats. Space & Missile Systems Center (SMC) is transforming the organization and implementation of space acquisition to an enterprise approach, maximizing innovation and resiliency, leveraging international, commercial, and mission partnerships, and managing program/project priorities according to an integrated unclassified/classified enterprise space architecture. Expanding the appropriate acquisition authorities and contract mechanisms to deliver capability sooner, SMC will strategically execute experimentation, prototyping, risk reduction, and other efforts to develop new or repurpose capabilities.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver the weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program elements 1206392F and 1206398F.

This effort is in Budget Activity 4, Advanced Component Development and Prototypes (ACD&P), because efforts are necessary to evaluate integrated technologies, representative modes or prototype systems in a high fidelity and realistic operating environment.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force				Date: May 2021	
Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>		R-1 Program Element (Number/Name) PE 1206425F / <i>Space Situation Awareness Systems</i>			
B. Program Change Summary (\$ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Previous President's Budget	29.776	0.000	0.000	0.000	0.000
Current President's Budget	29.013	0.000	0.000	0.000	0.000
Total Adjustments	-0.763	0.000	0.000	0.000	0.000
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	-0.763	0.000			
• Other Adjustments	0.000	0.000	0.000	0.000	0.000
C. Accomplishments/Planned Programs (\$ in Millions)	FY 2020	FY 2021	FY 2022		
Title: DARC Technology Maturation and Prototype Development	0.000	0.000	0.000		
Description: Deep Space Advanced Radar Concept (DARC) will leverage ongoing defense science and technology efforts to mature radar concepts and technologies to develop and evaluate prototypes that demonstrate increased sensitivity, capacity, search rates, and scalability to detect, track and maintain custody of objects in deep space orbit. This effort will analyze and select the most promising technologies to move forward into system development and operations and a PoR.					
FY 2021 Plans: N/A					
FY 2022 Plans: N/A					
Title: DARC Site 1 Operational Capability	29.013	0.000	0.000		
Description: The Deep Space Advance Radar Capability Middle Tier Acquisition (MTA) activity will use knowledge gained through the Deep Space Advanced Radar Concept technology demonstration to identify system specifications and a Government Reference Architecture (GRA). The specification and GRA will then support a competition for a global Deep Space Capability system. This MTA activity will use market research and a Government Reference Architecture developed previously to provide the knowledge to determine the acquisition approach through further prototyping and/or rapid acquisition.					
The MTA activity will develop, test, and deliver three radar sites located strategically around the world to provide a global Deep Space Radar Capability to support Space Situational Awareness (SSA). The system will be responsive to regularly scheduled and					

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force		Date: May 2021		
Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>		R-1 Program Element (Number/Name) PE 1206425F / <i>Space Situation Awareness Systems</i>		
C. Accomplishments/Planned Programs (\$ in Millions)		FY 2020	FY 2021	FY 2022
<p>un-scheduled tasks to locate, identify, characterize deep space objects and report the results to the SSN and Battle Management Command and Control locations.</p> <p>Leverage ongoing DARC Technology Maturation and Prototype Development efforts and defense science and technology efforts to initiate PoR for the DARC global radar capability. Supports standup of the DARC program office, award of contract for the DARC global radar capability, and completion of the engineering, manufacturing, and development of the first site through Critical Design Review (CDR).</p> <p>FY 2021 Plans: N/A</p> <p>FY 2022 Plans: N/A</p>				
Accomplishments/Planned Programs Subtotals		29.013	0.000	0.000
D. Other Program Funding Summary (\$ in Millions)				
N/A				
Remarks				
E. Acquisition Strategy				
<p>Project utilizes existing DoD engineering and study contracts and activities to conduct science and technology development and data analysis activities. Preliminary/critical design effort for the technology maturation and prototype commenced in FY 2017. A Broad Agency Announcement (BAA) was used to award seven Integrated System Engineering Team (ISET) contracts which allow for organizations to participate, advise the government, and gain insight into the prototype design and build. In May of 2019 DARC was designated as an Middle Tier Acquisition under Section 804 of the 2016 National Defense Authorization Act (NDAA). DARC PoR will be a full and open industry competition combining both University Affiliated Research Centers (UARC) and industry. The PoR will consist of three global, incrementally fielded, and simultaneously constructed sites during the years FY 2023 through FY 2025.</p>				

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Air Force												Date: May 2021			
Appropriation/Budget Activity				R-1 Program Element (Number/Name)				Project (Number/Name)							
3600 / 4				PE 1206425F / Space Situation Awareness Systems				640290 / Deep Space Advanced Radar Concept							
Product Development (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
DARC Concept Definition, Prototype Development and Analysis	SS/CPAF	JHL-APL : Laurel, MD	-	16.710	Jul 2020	-		-		-		-	-	-	-
DARC Concept Definition, Prototype Development and Analysis (1)	TBD	TBD : TBD	-	0.300	Feb 2020	-		-		-		-	-	-	-
Subtotal			-	17.010		-		-		-		-	-	-	N/A
Support (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Prototype System and Sustainment Analyses	PO	AFRL : Albuquerque, NM	-	0.010	Jan 2020	-		-		-		-	-	-	-
Subtotal			-	0.010		-		-		-		-	-	-	N/A
Management Services (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
A&AS	Various	Various : Various	-	5.350	Jul 2020	-		-		-		-	-	-	-
FFRDC	SS/FP	MITRE Corp : Colorado Springs, CO	-	6.100	Jul 2020	-		-		-		-	-	-	-
Other Support	Various	Various : Colorado Springs, CO	-	0.543	Jul 2020	-		-		-		-	-	-	-
Subtotal			-	11.993		-		-		-		-	-	-	N/A
Project Cost Totals			-	29.013		0.000		-		-		-	-	-	N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Air Force							Date: May 2021			
Appropriation/Budget Activity 3600 / 4			R-1 Program Element (Number/Name) PE 1206425F / <i>Space Situation Awareness Systems</i>			Project (Number/Name) 640290 / <i>Deep Space Advanced Radar Concept</i>				
	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract	

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 1206425F / <i>Space Situation Awareness Systems</i>	Project (Number/Name) 640290 / <i>Deep Space Advanced Radar Concept</i>

FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

DARC	
Prototype Build and Test	
Operational Demonstrations	
Develop Documentation and Request for Proposal	

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Exhibit R-4A, RDT&E Schedule Details: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 1206425F / <i>Space Situation Awareness Systems</i>	Project (Number/Name) 640290 / <i>Deep Space Advanced Radar Concept</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
DARC				
Prototype Build and Test	1	2020	4	2020
Operational Demonstrations	4	2020	4	2020
Develop Documentation and Request for Proposal	1	2020	4	2020

Note

DARC Site 1 estimated completion date and Initial Operating Capability (IOC) is FY 2025.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force</i> / BA 4: <i>Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 1206427F / <i>Space Systems Prototype Transitions (SSPT)</i>
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COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
Total Program Element	-	137.470	0.000	0.000	0.000	0.000	-	-	-	-	-	-
645601: <i>Space System Prototype Transition</i>	-	137.470	0.000	0.000	0.000	0.000	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

Per FY 2016 National Defense Authorization Act, the Evolved Expendable Launch Vehicle (EELV) program was renamed National Security Space Launch (NSSL) program. In association with the NSSL name change direction, the Air Force has renamed the Long Duration Propulsive (EELV Secondary Payload Adapter (ESPA)) (LDPE) program to be the ROOSTER program. Pre-existing LDPE-1, LDPE-2 and LDPE-3A mission names will remain unchanged.

A. Mission Description and Budget Item Justification

In FY2021, PE 1206427F, Space Systems Prototype Transitions (SSPT) efforts were transferred to Appropriation 3620F, Research, Development, Test & Evaluation, Space Force, PE 1206427SF, Space Systems Prototype Transitions (SSPT) from Appropriation 3600F, Budget Activity 04 due to the creation of a new Appropriation for Space Force.

\$8.787M is included in FY 2021 in the request for Appropriation 3600, Research, Development, Test & Evaluation, Air Force, PE 1206427F; these funds should have been requested under Appropriation 3620 Research, Development, Test & Evaluation, Space Force, PE 1206427SF.

The Space System Prototype Transition (SSPT) Program will identify and address space technology and capability gaps in order to facilitate technology transition to military space prototypes and programs of record. It will conduct a wide array of activities to model, integrate, test, and provide launch integration and support on-orbit testing of prototype technologies. The supported activities include: systems engineering, technology planning, development, demonstrations and testing, as well as modeling, simulations and exercises to support the development and maturation of tactics and procedures. This includes the development and prototyping of critical technology within the Department of Defense, across other government agencies, academic institutions and industry partners that are identified and the necessary systems engineering to effectively employ such systems.

Specifically the SSPT project will include a cost-effective framework to identify, mature and transition demonstrations and prototypes to:

- Rapidly address identified technology or capability gaps
- Accelerate the maturation of systems intended for demonstrations/prototypes that enhance/compliment/replace an existing capability
- Support a more reliable, available, maintainable and survivable military space enterprise
- Energize the space industrial base supporting U.S. national security
- Focus S&T Innovation and facilitate its transition to military space programs of record

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 1206427F / <i>Space Systems Prototype Transitions (SSPT)</i>	
<p>This program includes efforts for Rapid On-Orbit Space Technology Evaluation Ring (ROOSTER), Tetra, Blackjack, Quasi-Zenith Satellite System (QZSS)-Hosted Payload (HP) and Military Application of the Space Environment (MASE):</p> <p>ROOSTER is designated to provide a flexible orbit capability to host and deploy numerous prototypes and payloads utilizing excess payload margin available on AFSPC launch missions.</p> <p>Tetra will provide training platform for operators to develop and demonstrate tactics, techniques and procedures for prototype missions. The experiment directly supports the evolution of U.S. space situational awareness and control.</p> <p>Blackjack is a joint technology demonstration project by DARPA and the Air Force to evaluate military utility and concepts of operation for a Proliferated Low Earth Orbit (P-LEO) satellite constellation. The project leverages industry innovation in commercial P-LEO concepts by integrating military payloads onboard commercial commoditized satellite vehicles, demonstrating onboard data processing and autonomous tasking, and transmitting encrypted data through a mesh network of satellites in LEO with the goals of augmenting existing warfighter capability, increasing national security space resiliency, and decreasing per-unit satellite costs.</p> <p>QZSS-HP is a "pacesetter" hosted payload that is a high priority for the U.S. and Japan, paving the way for future Allied collaborations. It enhances Geostationary Earth Orbit (GEO) Space Situational Awareness capabilities over the Eurasian theater and facilitates resilient capabilities in the Space Surveillance Network (SSN).</p> <p>MASE effort will demonstrate mature space environment technology to improve combat operations. MASE will enhance regional ionospheric specification (nowcasts) and predictions (forecasts) affecting signal propagation paths. MASE uses traditional and non-traditional ionospheric measurements in advanced space environment models to forecast and predict impacts to weapon systems. It contributes to satisfying Gaps 4 and 7 of the Space-Based Environmental Monitoring (SBEM) requirements. MASE was a new start in FY 2019 in the Weather System Follow-On Program, PE 1206422F, and transferred to the Space Systems Prototype Transitions (SSPT) program PE 1206427F in FY 2021.</p> <p>Space acquisition must respond with speed and agility to emerging adversary threats. Space & Missile Systems Center (SMC) has transformed the organization and implementation of space acquisition to an enterprise approach, maximizing innovation and resiliency, leveraging international, commercial, and mission partnerships, and managing program/project priorities according to an integrated unclassified/classified enterprise space architecture. Expanding the appropriate acquisition authorities and contract mechanisms to deliver capability sooner, SMC will strategically execute experimentation, prototyping, risk reduction, and other efforts to develop new or repurpose capabilities.</p> <p>This program element may include necessary civilian pay expenses required to manage, execute, and deliver SSPT capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program elements 1206392F and 1206398F.</p> <p>This effort is in Budget Activity 4, Advanced Component Development and Prototypes (ACD&P), because efforts are necessary to evaluate integrated technologies, representative modes or prototype systems in a high fidelity and realistic operating environment.</p>		

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force	Date: May 2021
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Appropriation/Budget Activity 3600: Research, Development, Test & Evaluation, Air Force I BA 4: Advanced Component Development & Prototypes (ACD&P)	R-1 Program Element (Number/Name) PE 1206427F I Space Systems Prototype Transitions (SSPT)
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B. Program Change Summary (\$ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Previous President's Budget	142.045	8.787	0.000	0.000	0.000
Current President's Budget	137.470	0.000	0.000	0.000	0.000
Total Adjustments	-4.575	-8.787	0.000	0.000	0.000
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	-8.787			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	-4.575	0.000			
• Other Adjustments	0.000	0.000	0.000	0.000	0.000

Change Summary Explanation

FY 2021: \$142.808M; funds starting in FY 2021 were transferred from RDT&E, Air Force to RDT&E, Space Force.

FY 2021: \$8.787M: Adjustment to fund MASE effort; funds did not transferred properly from RDT&E, Air Force to RDT&E, Space Force R-1 Line #5.

C. Accomplishments/Planned Programs (\$ in Millions)	FY 2020	FY 2021	FY 2022
Title: Technology Maturation and Prototype Development	114.696	0.000	0.000
Description: Plan, develop, test and transition advanced technologies into space system prototypes and capabilities to meet known and emerging threats. Conduct architecture studies, modeling and simulation, technical development, integration and test activities in preparation for transition of critical technologies into prototypes or space programs of record. Develop advanced capabilities for rapid prototyping and integration into space system programs of record and, if requested, to war-fighter Urgent Operational Needs (UONs) and Joint Urgent Operational Needs (JUONs).			
FY 2021 Plans: N/A			
FY 2022 Plans: N/A			
Title: Prototype Integration, Test and On-Orbit Prototype Demonstration	22.774	0.000	0.000
Description: Provide rideshare opportunities for prototypes and experiments, fund mission-unique payload integration to the rideshare or launch system, and conduct launch base integration, testing and launch operations. Conduct prototype integration			

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force		Date: May 2021		
Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>		R-1 Program Element (Number/Name) PE 1206427F / <i>Space Systems Prototype Transitions (SSPT)</i>		
C. Accomplishments/Planned Programs (\$ in Millions)		FY 2020	FY 2021	FY 2022
and testing into the designated Command and Control system and provide operational support to conduct prototype testing, demonstration and operations.				
FY 2021 Plans: N/A				
FY 2022 Plans: N/A				
Title: Military Application of the Space Environment (MASE)		-	0.000	-
Description: MASE is not a new start as it was previously funded in Appropriation 3600, RDT&E, Air Force, PE 1206422F, Weather System Follow-on.				
FY21 funds for the MASE effort did not transfer properly from RDT&E, Air Force to RDT&E, Space Force R-1 Line #5.				
MASE demonstrates a sensor-to-shooter solution to improve mission effectiveness by providing commanders an operational risk assessment tool. MASE will deliver a capability comprised of weapon system tailored visualizations/decision aids to allow warfighter integration into operational plans and tactics, techniques, and procedures. MASE products and services will be evaluated using quantitative standard measures of performance, effectiveness and outcome against theater operational requirements.				
FY 2021 Plans: Continue to conduct studies and perform technical analysis for external data sources and system integration, optimal sensor laydown, and system development. Continue to enhance and improve MASE-related prototypes and models while maintaining Risk Management Framework (RMF) compliance. Conduct field campaigns to validate scientific algorithms, provision cloud services, and deploy ionospheric ground sensors. Rapidly respond to implement system resiliency and situational awareness necessary to operate in the contested space domain. Activities may include but are not limited to program office support, studies, technical analysis, experimentation, prototyping, etc.				
FY 2021 to FY 2022 Increase/Decrease Statement: Project transferred to Appropriation 3620				
Accomplishments/Planned Programs Subtotals		137.470	0.000	0.000
D. Other Program Funding Summary (\$ in Millions)				
N/A				

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force Date: May 2021

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 1206427F / <i>Space Systems Prototype Transitions (SSPT)</i>
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D. Other Program Funding Summary (\$ in Millions)

Remarks

E. Acquisition Strategy

All contracts funded in this program element will be awarded using competitive procedures to the maximum extent possible. The SSPT program consists of numerous small projects in which the program office will leverage rapid prototyping authorities to the maximum extent possible.

In May 2019 the first three LDPE systems were awarded competitively. The LDPE Acquisition Strategy was amended to include the addition of LDPE-3A. LDPE-3A was justified to be awarded sole source as an option to the existing contract. The acquisition strategy for the follow-on effort to LDPE, called ROOSTER is in work, but expected to be competitively awarded.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 1206427F / <i>Space Systems Prototype Tr</i> <i>ansitions (SSPT)</i>	Project (Number/Name) 645601 / <i>Space System Prototype</i> <i>Transition</i>
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Product Development (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Tetra-1,2 & 3 Integration & On-Orbit Prototype Demonstration	C/FFP	Various : Various	-	8.307	Nov 2019	-		-		-		-	-	-	-
Tetra-3 & 4 Development	C/FFP	York Space Systems : Denver, CO	-	7.226	Nov 2019	-		-		-		-	-	-	-
Sensor XVI	C/FFP	Viasat : Carlsbad, CA	-	1.350	Jan 2020	-		-		-		-	-	-	-
LDPE-1, 2 & 3A Launch Vehicle Integration & Ops	C/CPFF	Northrop Grumman Inno Sys : Dulles, VA	-	14.468	Nov 2019	-		-		-		-	-	-	-
LDPE-3A Development	SS/FFP	Northrop Grumman Inno Sys : Dulles, VA	-	22.692	Feb 2020	-		-		-		-	-	-	-
Blackjack Development	MIPR	Various : Various	-	48.721	Nov 2019	-		-		-		-	-	-	-
QZSS-HP Development	Various	Various : Various	-	24.240	Nov 2019	-		-		-		-	-	-	-
MASE Development	C/Various	Various : CO	-	-		0.000	Nov 2020	-		-		-	-	-	-
Subtotal			-	127.004		0.000		-		-		-	-	-	N/A

Management Services (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
FFRDC	RO	Various : Various	-	6.185	Jan 2020	-		-		-		-	-	-	-
A&AS	Various	Various : Various	-	3.686	Feb 2020	-		-		-		-	-	-	-
Other Support	Various	Various : El Segundo, CA	-	0.595	Oct 2019	-		-		-		-	-	-	-
Subtotal			-	10.466		-		-		-		-	-	-	N/A

	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals		-	137.470	0.000	-	-	-	-	N/A

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Exhibit R-4, RDT&E Schedule Profile: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 1206427F / <i>Space Systems Prototype Tr</i> <i>ansitions (SSPT)</i>	Project (Number/Name) 645601 / <i>Space System Prototype</i> <i>Transition</i>

FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

Technology Maturation and Prototype Development

Tetra-2 Development	████████		
Tetra-3 Development	██████████		
Tetra-4 Development		████████	
Sensor XVI	██████████		
LDPE-2 Development	████████		
LDPE-3A Development		██████████	
Blackjack Development	██████████		
QZSS-HP: HPIU Development	██████████		
QZSS-HP: SSA Development	██████████		
Technology Maturation and Prototype	██████████		

Prototype Integration, Test and On-Orbit Prototype Demonstration

Tetra-2, 3 & 4 Launch and On-Orbit Prototype Demonstration	██████████		
Senor XVI and On-Orbit Prototype Demonstration		████████	
LDPE-1, 2, 3A & ROOSTER Launch and On-Orbit Prototype Demonstration	██████████		
Blackjack Launch/Support Activities			████
Prototype Integration, Test and On-Orbit Prototype	██████████		

MASE

MASE Development		██████████	
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Exhibit R-4A, RDT&E Schedule Details: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 1206427F / <i>Space Systems Prototype Tr</i> <i>ansitions (SSPT)</i>	Project (Number/Name) 645601 / <i>Space System Prototype</i> <i>Transition</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>Technology Maturation and Prototype Development</i>				
Tetra-2 Development	1	2020	2	2020
Tetra-3 Development	1	2020	4	2020
Tetra-4 Development	3	2020	4	2020
Sensor XVI	1	2020	4	2020
LDPE-2 Development	1	2020	2	2020
LDPE-3A Development	2	2020	4	2020
Blackjack Development	1	2020	4	2020
QZSS-HP: HPIU Development	1	2020	4	2020
QZSS-HP: SSA Development	1	2020	4	2020
Technology Maturation and Prototype	1	2020	4	2020
<i>Prototype Integration, Test and On-Orbit Prototype Demonstration</i>				
Tetra-2, 3 & 4 Launch and On-Orbit Prototype Demonstration	1	2020	4	2020
Senor XVI and On-Orbit Prototype Demonstration	3	2020	4	2020
LDPE-1, 2, 3A & ROOSTER Launch and On-Orbit Prototype Demonstration	1	2020	4	2020
Blackjack Launch/Support Activities	4	2020	4	2020
Prototype Integration, Test and On-Orbit Prototype	1	2020	4	2020
<i>MASE</i>				
MASE Development	1	2021	4	2021

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 1206438F / <i>Space Control Technology</i>
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COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
Total Program Element	-	56.270	0.000	0.000	0.000	0.000	-	-	-	-	-	-
642611: <i>Technology Insertion Planning and Analysis</i>	-	56.270	0.000	0.000	0.000	0.000	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

In FY2021, PE 1206438F, Space Control Technology efforts were transferred to Appropriation 3620, Research, Development, Test & Evaluation, Space Force, PE 1206438SF Space Control Technology from Appropriation 3600, Budget Activity 04 due to the creation of a new Appropriation for Space Force.

This project supports a range of activities including systems engineering, technology planning, development, demonstrations and prototyping, and testing, as well as modeling, simulations and exercises to support development and maturation of tactics and procedures for a responsive and resilient Space Control mission area. This includes technology development and prototyping for Defensive Counterspace (DCS) and Offensive Counterspace (OCS) and the necessary systems engineering for the warfighter to effectively employ such systems.

Specifically supported are DCS and Space Situational Awareness (SSA) activities which include developing threat warning payloads for monitoring, detecting, identifying, tracking, assessing, verifying, categorizing, and characterizing objects and events in space. Additionally, this activity supports the development of payload prototypes and space defense force packages for protecting U.S. space systems, resources, and operations from enemy attempts to negate, interfere, or destroy them.

Specific OCS activities include disruption, denial, or degradation (and associated Electronic Support) of adversary space systems which may be used for purposes hostile to U.S. national security interests. Rapid Reaction Capabilities in response to immediate warfighter needs in the Space Control mission area are developed within this program.

Space acquisition must respond with speed and agility to emerging adversary threats. Space & Missile Systems Center (SMC) is transforming the organization and implementation of space acquisition to an enterprise approach, maximizing innovation and resiliency, leveraging international, commercial, and mission partnerships, and managing program/project priorities according to an integrated unclassified/classified enterprise space architecture. Expanding the appropriate acquisition authorities and contract mechanisms to deliver capability sooner, SMC will strategically execute experimentation, prototyping, risk reduction, and other efforts to develop new or repurpose capabilities.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver Space Control Technology (SCT) weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program elements 1206392F and 1206398F.

Funding for this exhibit is contained in PE 1206438F.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 1206438F / <i>Space Control Technology</i>
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This effort is in Budget Activity 4, Advanced Component Development and Prototypes (ACD&P), because efforts are necessary to evaluate integrated technologies, representative modes or prototype systems in a high fidelity and realistic operating environment.

B. Program Change Summary (\$ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Previous President's Budget	58.231	0.000	0.000	0.000	0.000
Current President's Budget	56.270	0.000	0.000	0.000	0.000
Total Adjustments	-1.961	0.000	0.000	0.000	0.000
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	-1.961	0.000			
• Other Adjustments	0.000	0.000	0.000	0.000	0.000

C. Accomplishments/Planned Programs (\$ in Millions)	FY 2020	FY 2021	FY 2022
<p>Title: Rapid Reaction Branch</p> <p>Description: Develops advanced capabilities for rapid prototyping and integration into space control programs of record and, if requested, to warfighter Urgent Operational Needs (UONs) and Joint Urgent Operational Needs (JUONs). Conducts prototype capability development, testing, training and rapid transition of technology and techniques to space control systems. Sustains deployed quick reaction capabilities until transition to program of record or mission completion.</p> <p>FY 2021 Plans: N/A</p> <p>FY 2022 Plans: N/A</p>	16.797	0.000	0.000
<p>Title: Experimentation Platforms & Defense Force Packaging</p> <p>Description: This effort will acquire, outfit and operate microsat busses with the primary purpose of demonstrating new technologies, flight testing payloads or subsystems, and validating Tactics, Techniques, and Procedures (TTPs) to ensure the delivery of critical space effects throughout all phases of a future space conflict against an adaptive and thinking adversary. It also supports a range of activities developing, prototyping, and fielding a family of on-board and near-board, modular resilience payloads supporting threat warning and protection options for National Security Space High-Value satellites. These</p>	39.473	0.000	0.000

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force	Date: May 2021
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Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 1206438F / <i>Space Control Technology</i>
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C. Accomplishments/Planned Programs (\$ in Millions)	FY 2020	FY 2021	FY 2022
<p>payloads will be integrated with enterprise command and control capabilities for tasking, reporting, and response. On-orbit prototype demonstrations will be performed to demonstrate sensor/payload capabilities for high-value satellite force packaging requirements. Systems Engineering will enable the integration, interoperability and compatibility of new space control technology systems and capabilities amongst each other and amongst these new systems and the existing space control enterprise.</p> <p>FY 2021 Plans: N/A</p> <p>FY 2022 Plans: N/A</p>			
Accomplishments/Planned Programs Subtotals	56.270	0.000	0.000

D. Other Program Funding Summary (\$ in Millions)

N/A

Remarks

E. Acquisition Strategy

All contracts funded in this program element will be awarded using competitive procedures to the maximum extent possible.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 1206438F / <i>Space Control Technology</i>	Project (Number/Name) 642611 / <i>Technology Insertion Planning and Analysis</i>
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Product Development (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
SCT Counterspace Technology Prototyping/ Rapid Reaction Development	Various	Various : Various	-	15.277	Jan 2020	-		-		-		-	-	-	-
SCT Foundational Architecture	C/FFP	TBD : El Segundo, CA	-	12.410	Jan 2020	-		-		-		-	-	-	-
SCT Modeling & Sim; Payload Analysis and Alternatives	C/Various	Various : Various, CA	-	6.500	Dec 2019	-		-		-		-	-	-	-
SCT Sensor Prototype Development	C/Various	Various : Various, CA	-	17.063	Jan 2020	-		-		-		-	-	-	-
SCT Ground Infrastructure	Various	Various : Various, CA	-	2.500	Oct 2019	-		-		-		-	-	-	-
SCT High-Value Satellite Bus Requirements	Various	Various : Various, CA	-	1.000	Oct 2019	-		-		-		-	-	-	-
Subtotal			-	54.750		-		-		-		-	-	-	N/A

Remarks

N/A

Management Services (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
A&AS	Various	Various : Various, CA	-	1.520	Jan 2020	-		-		-		-	-	-	-
Subtotal			-	1.520		-		-		-		-	-	-	N/A

Project Cost Totals	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
	-	56.270	0.000	-	-	-	-	-	N/A

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Exhibit R-4, RDT&E Schedule Profile: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 1206438F / <i>Space Control Technology</i>	Project (Number/Name) 642611 / <i>Technology Insertion Planning and Analysis</i>

FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

RRB	
Rapid Prototyping	██████████
Signal Processing Lab GRA (dev) Increment 4	██████████
Capability Integration (Lab)	██████████
Capability tests (execute/report)	██████████
Ongoing capability DT planning/execution	██████████
Experimentation Platforms & Defense Force Packaging	
Military Utility Assessment	██████████
Database of Architectural Elements	██████████
Modeling & Simulation; Payload Analysis and Alternatives	██████████
Sensor Prototype Development	██████████
Ground Infrastructure	██████████
SCT High-Value Satellite Bus Requirements Definition	██████████

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Exhibit R-4A, RDT&E Schedule Details: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 1206438F / <i>Space Control Technology</i>	Project (Number/Name) 642611 / <i>Technology Insertion Planning and Analysis</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>RRB</i>				
Rapid Prototyping	1	2020	4	2020
Signal Processing Lab GRA (dev) Increment 4	1	2020	4	2020
Capability Integration (Lab)	1	2020	4	2020
Capability tests (execute/report)	1	2020	4	2020
Ongoing capability DT planning/execution	1	2020	4	2020
<i>Experimentation Platforms & Defense Force Packaging</i>				
Military Utility Assessment	1	2020	4	2020
Database of Architectural Elements	1	2020	4	2020
Modeling & Simulation; Payload Analysis and Alternatives	1	2020	4	2020
Sensor Prototype Development	1	2020	4	2020
Ground Infrastructure	1	2020	4	2020
SCT High-Value Satellite Bus Requirements Definition	2	2020	4	2020

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 1206730F / <i>Space Security and Defense Program</i>
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COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
Total Program Element	-	56.385	0.000	0.000	0.000	0.000	-	-	-	-	-	-
64A025: <i>Space Protection Program</i>	-	56.385	0.000	0.000	0.000	0.000	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-	-	-

A. Mission Description and Budget Item Justification

In FY 2022, PE 1206730F, SSDP efforts were transferred to Appropriation 3620, Research, Development, Test & Evaluation, Space Force, PE 1206730SF, SSDP from Appropriation 3600, Budget Activity 04 due to the creation of a new Appropriation for Space Force.

This Program Element funds the Department of Defense (DoD)/United States Space Force (USSF) Space Security and Defense Program (SSDP). The SSDP is a Joint DoD and Office of the Director of National Intelligence (ODNI) organization established to function as the center of excellence for options and strategies (materiel, non-materiel, cross-Title, cross-domain) leading to a more resilient and enduring National Security Space (NSS) Enterprise. The SSDP operates under the authority of the Deputy Secretary of Defense (DEPSECDEF) and Principal Deputy Director of National Intelligence (PDDNI) to lead and collaborate on space protection vulnerability, susceptibility, and mitigation assessments of NSS services for the purpose of identifying, assessing, validating and introducing protection solutions into existing requirements, budgeting and investment decision processes, informing the development of Concepts of Operations and Tactics, Techniques and Procedures (TTPs), and influencing policy along with program technical approaches. This unique mission provides an ongoing and crucial core protection competency that advances specific projects/activities (including non-kinetic techniques) to deliver comprehensive, economical and actionable solutions for both programmatic and operational domains.

The SSDP scope spans multiple space missions and stakeholders including the DoD, Intelligence Community (IC), civil, commercial, and international space entities that support NSS missions in both peacetime and throughout all phases of conflict. It is focused on being responsive to NSS stakeholders in providing technical and operational assessments of emergent threat concepts, and developing near-term and far-term plans to address architectures, strategies, threats, and vulnerabilities. SSDP Projects are structured/designed to have an impact across all time horizons; near-term focused efforts to complicate adversary operations, mid-term focused efforts to improve system and enterprise survivability, and long-term focused efforts to render adversary capabilities ineffective.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver SSDP capability leading to a more resilient and enduring NSS enterprise. The use of such program funds would be in addition to the civilian pay expenses budgeted in program elements 1206392F and 1206398F.

This effort is in Budget Activity 4, Advanced Component Development and Prototypes (ACD&P), because efforts are necessary to evaluate integrated technologies, representative modes or prototype systems in a high fidelity and realistic operating environment.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force	Date: May 2021
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Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 1206730F / <i>Space Security and Defense Program</i>
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B. Program Change Summary (\$ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Previous President's Budget	56.385	56.311	68.655	0.000	68.655
Current President's Budget	56.385	0.000	0.000	0.000	0.000
Total Adjustments	0.000	-56.311	-68.655	0.000	-68.655
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	-56.311			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	0.000	0.000			
• Other Adjustments	0.000	0.000	-68.655	0.000	-68.655

Change Summary Explanation

The three product areas described in last years R-Doc (Enterprise Capabilities & Solutions; Mission Area Protection Concepts & Architectures; and Operational Tactics, Experiments & Prototypes) are continuing in roughly the same proportions. As SSDP puts more emphasis on offensive force design and future technology architectures, bins described in this document have been altered to better reflect the portion of the architecture that will be effected in upcoming years. The new product areas are; Defend the Legacy Architecture; Develop a Resilient & Responsive Architecture; and Prepare for the Future Fight. Continuing and new SSDP projects have been re-binned into these areas.

C. Accomplishments/Planned Programs (\$ in Millions)	FY 2020	FY 2021	FY 2022
<p>Title: Space Protection and Survivability</p> <p>Description: SSDP organizes, plans, and executes specific analysis, experimentation and prototyping projects. Project prioritization and content is informed by tailored space threat characterizations, leveraging the program's extensive ties to the larger National Security Space (NSS) and Intelligence Communities (IC). These tailored characterizations are anchored to the IC's most current intelligence reporting and foundational assessments. Where gaps in available intelligence information negatively impact the ability to pursue viable solutions, SSDP expands upon existing threat information through detailed technical and operational analysis, such as to account for evolved/future threat developments, to ensure the enduring effectiveness of proposed threat mitigation solutions. The process includes decomposition of each threat to identify potential countermeasures and defeat opportunities. Projects will support development of TTPs and CONOPS for protection solutions developed by SSDP partners across the NSS Enterprise. Projects in all three areas will include non-kinetic solutions for protecting specific capabilities and the NSS Enterprise.</p> <p>The program will accomplish these goals through in-depth technical analysis utilizing in-house high-fidelity M&S tools, physics-based models, selective partnering with national labs, and advanced data studies and experimental data analytics along with other</p>	56.385	0.000	0.000

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force	Date: May 2021
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Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 1206730F / <i>Space Security and Defense Program</i>
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C. Accomplishments/Planned Programs (\$ in Millions)	FY 2020	FY 2021	FY 2022
<p>means/methods as required to deliver actionable, timely and efficient protection solutions. This deliberate variation in approach allows the program to tailor its efforts to the unique challenges and needs of each project and provide the analytical rigor essential for informing experiment/prototype selection and design to ensure the highest possible return on investment and mission impact.</p> <p><i>FY 2021 Plans:</i> FY2021 program activities focus on in-depth technical analysis utilizing tailored modeling & simulation (M&S) complemented by focused warfighter/operator engagements in support of both pre-planned and emergent NSS protection analysis, experimentation and prototyping goals. The program will be responsive to time sensitive and evolving enterprise requirements throughout the year while maintaining momentum on addressing enduring and projected space protect and defense requirements at both the system and enterprise levels. Specific program projects are selected based on a deep understanding of the threat enabled by the program's extensive ties to the larger NSS and Intelligence Community (IC). The program will use the IC's foundational assessments, combined with engineering analysis, to craft threat characterizations; capturing both current and evolved/future capabilities which are tailored to inform SSDP's priorities and associated project activities. These tailored products will support studies, experiments, and analysis to identify potential opportunities to counter threats across their operational envelopes. The program will then evaluate the effectiveness of exploiting these opportunities, alone or in layered packages, against the projected threats. Finally, based on this analysis, the program will initiate in-house, or with a mission partner, projects to exploit and combine these opportunities into a set of layered activities with the intended effect of countering adversary threats.</p> <p>Specific to FY2021, Enterprise Capabilities & Solutions projects will utilize the program's broad and robust physics-based M&S capabilities, its maturing campaign and enterprise level rapid analysis capabilities, and its experienced cadre of analysts to: Examine planned DOD and IC programs, experiments and demonstrations to provide protection recommendations to preserve U.S. capabilities; mature analysis capabilities focused on evaluating protection options for PLEO systems, and their impact on the space and multi-domain campaigns; recommend architecture and policy solutions/changes to optimize the deployment of new capabilities to deliver critical warfighting effects to include the necessary C2; influence policy and guidance across the NSS enterprise while advancing towards more resilient future architectures; and explore early phase reversible protect and defend Electronic Warfare (EW) related capabilities to provide greater flexibility and freedom of maneuver to win the space fight.</p> <p>FY2021 Operational Tactics, Experiments & Prototypes projects will incorporate C2, SSA, and Space Control concepts, planned capabilities and TTPs into relevant/targeted prototyping and experimentation activities to: Mature and shape CONOPS for programed/anticipated systems through rigorous analysis informed by experimentation and prototyping (both in-house and with/through mission partners); develop force packages for Combatant Commanders providing multiple options across all phases of conflict vs. specific adversary capabilities supported by tools allowing for operational level space C2 Course of Action (COA) planning informed by quantitative analysis of COA results; and incorporate objectives to demonstrate Title 10/50 space protection coordination, explore data fusion and, potentially, include the integration of commercial tools and services. The program will</p>			

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force	Date: May 2021
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Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 1206730F / <i>Space Security and Defense Program</i>
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C. Accomplishments/Planned Programs (\$ in Millions)	FY 2020	FY 2021	FY 2022
<p>accomplish these goals through in-depth technical analysis utilizing in-house high-fidelity M&S tools, physics-based models, selective partnering with national labs, and advanced data studies and experimental data analytics along with other means/ methods as required to deliver actionable, timely and efficient protection solutions. This deliberate variation in approach allows the program to tailor its efforts to the unique challenges and needs of each project and provide the analytical rigor essential for informing experiment/prototype selection and design to ensure the highest possible return on investment and mission impact. The program's FY2021 projects will have the combined impact of continuing to mature and enhance the protection-oriented tools, policies, requirements and programs necessary to maintain and accelerate progress towards achieving resilience across the NSS enterprise. In the face of an increasingly complex and contested space environment, this capacity and capability is central to national security space protection efforts and is a critical advancement for staying abreast and ahead of both current and next generation threats.</p> <p>FY 2022 Plans: N/A</p> <p>FY 2021 to FY 2022 Increase/Decrease Statement: N/A</p>			
Accomplishments/Planned Programs Subtotals	56.385	0.000	0.000

D. Other Program Funding Summary (\$ in Millions)
N/A

Remarks

E. Acquisition Strategy
All contracts funded in this program element will be awarded using competitive procedures to the maximum extent possible. The program consists of numerous small projects.

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Exhibit R-4A, RDT&E Schedule Details: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 1206730F / <i>Space Security and Defense Program</i>	Project (Number/Name) 64A025 / <i>Space Protection Program</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>Space Protection and Survivability</i>				
Defend the Legacy Architecture	1	2020	4	2021
Develop a Resilient & Responsive Architecture	1	2020	4	2021
Prepare for the Future Fight	1	2020	4	2021

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 1206760F / <i>Protected Tactical Enterprise Service (PTES)</i>
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COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
Total Program Element	-	101.583	0.000	0.000	0.000	0.000	-	-	-	-	-	-
643726: <i>PTES</i>	-	101.583	0.000	0.000	0.000	0.000	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-	-	-

A. Mission Description and Budget Item Justification

The global threat of electronic warfare attacks against space systems will expand in the coming years in both number and types of weapons. Threat development will very likely focus on jamming capabilities against dedicated military satellite communications (MILSATCOM). To address this critical need, the Department of the Air Force (DAF) is developing the Protected Tactical Enterprise Service (PTES) ground system to provide worldwide, anti-jam, Low Probability of Intercept (LPI) communications for tactical warfighters. PTES will utilize the Protected Tactical Waveform (PTW) to provide anti-jam communications via military and commercial satellite systems for tactical users in all Services. Initially, PTES will utilize the Wideband Global SATCOM (WGS) system and may be expanded later to include commercial satellites and the Protected Tactical SATCOM (PTS) system.

The PTES program is developing a mission management system (MMS), a key management system (KMS) and hub system to enable PTW via transponded WGS satellites, with future extension to commercial SATCOM. Production-representative PTW modems for user terminals are being developed by the Protected Tactical Service Field Demonstration (PTSFD) and will be separately acquired by each Service and by international partners.

To meet the warfighter requirements for protected tactical MILSATCOM and the capability gaps identified in these studies, RDT&E funding is required for architectural development, acquisition strategy development, system requirements and system trades analysis, and engineering, manufacturing, developing, testing and evaluating PTES systems and segments.

The PTES rapid prototype addresses an urgent operational need in the Pacific region by achieving Initial Operational Capability (IOC) in 2023. IOC provides ground elements for PTW over WGS and consists of PTES installation at two WGS Gateway sites utilizing one WGS satellite. The Navy Wideband Anti-Jam Modem System (WAMS) relies on PTES to provide PTW ground infrastructure. The DAF is utilizing FY 2016 National Defense Authorization Act, Section 804, Middle Tier of Acquisition for Rapid Prototyping authority to deliver a PTES Operational Demonstration meeting the Navy's Minimum Viable Product in FY 2022. At Full Operational Capability (FOC) PTES will provide worldwide PTW operations using up to all WGS satellites.

Space acquisition must respond with speed and agility to emerging adversary threats. Space & Missile Systems Center (SMC) has transformed the organization and implementation of space acquisition to an enterprise approach, maximizing innovation and resiliency, leveraging international, commercial, and mission partnerships, and managing program/project priorities according to an integrated unclassified/classified enterprise space architecture. Expanding the appropriate acquisition authorities and contract mechanisms to deliver capability sooner, SMC will strategically execute experimentation, prototyping, risk reduction, and other efforts to develop new or repurpose capabilities.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force	Date: May 2021
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Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 1206760F / <i>Protected Tactical Enterprise Service (PTES)</i>
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This program element may include necessary civilian pay expenses required to manage, execute, and deliver PTES weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program elements 1206392F and 1206398F.

This effort is in Budget Activity 4, Advanced Component Development and Prototypes (ACD&P), because efforts are necessary to evaluate integrated technologies, representative modes or prototype systems in a high fidelity and realistic operating environment.

B. Program Change Summary (\$ in Millions)	<u>FY 2020</u>	<u>FY 2021</u>	<u>FY 2022 Base</u>	<u>FY 2022 OCO</u>	<u>FY 2022 Total</u>
Previous President's Budget	105.003	0.000	0.000	0.000	0.000
Current President's Budget	101.583	0.000	0.000	0.000	0.000
Total Adjustments	-3.420	0.000	0.000	0.000	0.000
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	-3.420	0.000			
• Other Adjustments	0.000	0.000	0.000	0.000	0.000

C. Accomplishments/Planned Programs (\$ in Millions)	<u>FY 2020</u>	<u>FY 2021</u>	<u>FY 2022</u>
Title: PTES Prototype Development	101.583	0.000	0.000
Description: After competitive contract award, the PTES team will develop a prototype consisting of three segments: a MMS, a KMS, and joint hubs integrated into existing SATCOM gateways. PTES will enable an anti-jam communications capability via PTW over WGS for tactical users in all Services and International Partners. The PTES team will be responsible for developing all PTES segments and performing all system integration, including end-to-end tests of the complete PTES prototype.			
FY 2021 Plans: N/A.			
FY 2022 Plans: N/A			
Accomplishments/Planned Programs Subtotals	101.583	0.000	0.000

D. Other Program Funding Summary (\$ in Millions)
N/A

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force Date: May 2021

Appropriation/Budget Activity 3600: Research, Development, Test & Evaluation, Air Force I BA 4: Advanced Component Development & Prototypes (ACD&P)	R-1 Program Element (Number/Name) PE 1206760F I Protected Tactical Enterprise Service (PTES)
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D. Other Program Funding Summary (\$ in Millions)

Remarks

Associated WAMS funding is contained within Navy Multiband Terminal (NMT) program.

E. Acquisition Strategy

PTES was designated as a rapid prototype in June 2018 under section 804 of the National Defense Authorization Act for Fiscal Year 2016 (Public Law 114-92). The objective of the PTES ground system is to provide an operational anti-jam communications capability via WGS using PTW. The PTES acquisition approach is to competitively award a single contract to develop and field PTES, through declaration of IOC. Boeing and sub-contractors will be responsible for developing all PTES segments (MMS, KMS, and Hub) and performing all system integration, including end-to-end tests of the complete PTES prototype. The 45th Test Squadron is planned to be the PTES Developmental Test organization and Air Force Operational Test and Evaluation Center (AFOTEC) is planned to be the Operational Test organization.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Air Force												Date: May 2021				
Appropriation/Budget Activity				R-1 Program Element (Number/Name)				Project (Number/Name)								
3600 / 4				PE 1206760F / Protected Tactical Enterprise Service (PTES)				643726 / PTES								
Product Development (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total				
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract	
Protected Tactical Enterprise Service Prototype Development	C/CPIF	Boeing : El Segundo, CA	-	74.920	Oct 2019	-		-		-		-	-	-	-	
Data Center	Various	Various : Various	-	0.305	Feb 2020	-		-		-		-	-	-	-	
Technical Mission Analysis	MIPR	Aerospace : El Segundo, CA	-	6.525	Jan 2020	-		-		-		-	-	-	-	
Enterprise SE&I	Various	Various : Various	-	9.928	Oct 2019	-		-		-		-	-	-	-	
Subtotal			-	91.678		-		-		-		-	-	-	N/A	
Test and Evaluation (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total				
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract	
Test Planning & Execution DT/OT	Various	Various : Various	-	5.456	Nov 2019	-		-		-		-	-	-	-	
Subtotal			-	5.456		-		-		-		-	-	-	N/A	
Management Services (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total				
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract	
FFRDC	MIPR	Aerospace : El Segundo, CA	-	0.132	Jan 2020	-		-		-		-	-	-	-	
A&AS	Various	Various : Various	-	4.167	Oct 2019	-		-		-		-	-	-	-	
Other Support	Various	Various : Various	-	0.150	Oct 2019	-		-		-		-	-	-	-	
Subtotal			-	4.449		-		-		-		-	-	-	N/A	
Project Cost Totals			-	101.583		0.000		-		-		-	-	-	N/A	

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Air Force							Date: May 2021			
Appropriation/Budget Activity 3600 / 4			R-1 Program Element (Number/Name) PE 1206760F / <i>Protected Tactical Enterprise Service (PTES)</i>			Project (Number/Name) 643726 / <i>PTES</i>				
	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract	

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2022 Air Force			Date: May 2021
Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 1206760F / <i>Protected Tactical Enterprise Service (PTES)</i>	Project (Number/Name) 643726 / PTES	

	FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

PTES	
PTES Prototype Development	
Software Build 1	
Software Build 2	
Preliminary Design Review (PDR)	
Developmental/Operational Testing (to include Planning)	

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Exhibit R-4A, RDT&E Schedule Details: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 1206760F / <i>Protected Tactical Enterprise Service (PTES)</i>	Project (Number/Name) 643726 / <i>PTES</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
PTES				
PTES Prototype Development	1	2020	4	2020
Software Build 1	1	2020	3	2020
Software Build 2	3	2020	4	2020
Preliminary Design Review (PDR)	4	2020	4	2020
Developmental/Operational Testing (to include Planning)	1	2020	4	2020

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 1206761F / <i>Protected Tactical Service (PTS)</i>
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COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
Total Program Element	-	154.237	0.000	0.000	0.000	0.000	-	-	-	-	-	-
643728: <i>Protected Tactical SATCOM</i>	-	154.237	0.000	0.000	0.000	0.000	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-	-	-

A. Mission Description and Budget Item Justification

The global threat of electronic warfare attacks against space system will expand in the coming years in both number and types of weapons. Threat development will very likely focus on jamming capabilities against dedicated military satellite communications. To address this critical need, the Air Force is developing the Protected Anti-jam Tactical Satellite Communications (PATs) family-of-systems, of which the Protected Tactical Satellite Communications (PTS) program was a New Start in FY 2018 to fulfill the highest level of anti-jam capabilities to mitigate adversarial jamming effects. PTS provides worldwide and polar, beyond-line-of-sight, Anti-Jam (AJ), low-probability-of intercept communications in benign and highly-contested environments utilizing the Protected Tactical Waveform (PTW). PTS, with its on-board payload processing and antenna design, enables reliable tactical satellite communications within close proximities to adversarial jammers. The system also employs interfaces consistent with Air Force Space Command's on-going resilience initiatives and Enterprise Ground Services (EGS); thereby enhancing mission assurance, resiliency, and interoperability.

The Air Force is utilizing FY 2016 National Defense Authorization Act, Section 804, Middle Tier of Acquisition for Rapid Prototyping authority and Section 815, Other Transaction Authority (OTA), to achieve an affordable, rapid, operational capability for the tactical warfighter. This strategy employs spiral payload development to progressively and incrementally deploy prototypes with residual capabilities demonstrated in an operational environment. These spiral payload prototypes demonstrate innovative anti-jam technologies with modular and scalable payloads to meet validated military needs for protected tactical communications. This includes technical baseline development, systems engineering trade analyses, internal/external system integration and development, candidate system architecture evaluations, risk reduction demonstrations, prototyping concepts development, system testing, and enabling technologies maturation.

PTS includes a space segment, ground segment and gateway segment. For the space segment, the Air Force strategy utilizes a payload-centric focus to enable an affordable, resilient space architecture. This enables hosting and rideshare opportunities with other US government, commercial, International Partner satellites or integration onto a commodity satellite bus. For the ground segment, PTS leverages the EGS for satellite command and control, and the Protected Tactical Enterprise Service (PTES) rapid prototyping activity for mission and key management planning. The PTS gateway segment enables tactical warfighters reach back to global DoD Information Network. The PTS user terminal segment, not included in this PTS acquisition, will be procured by the military Services utilizing low-cost PTW modem upgrades enabled by the Protected Tactical Service Field Demonstration technology demonstration program.

Space acquisition must respond with speed and agility to emerging adversary threats. Space & Missile Systems Center (SMC) is transforming the organization and implementation of space acquisition to an enterprise approach, maximizing innovation and resiliency, leveraging international, commercial, and mission partnerships, and managing program/project priorities according to an integrated unclassified/classified enterprise space architecture. Expanding the appropriate acquisition

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force	Date: May 2021
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Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 1206761F / <i>Protected Tactical Service (PTS)</i>
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authorities and contract mechanisms to deliver capability sooner, SMC will strategically execute experimentation, prototyping, risk reduction, and other efforts to develop new or repurpose capabilities.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver PTS weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program elements 1206392F and 1206398F.

This effort is in Budget Activity 4, Advanced Component Development and Prototypes (ACD&P), because efforts are necessary to evaluate integrated technologies, representative modes or prototype systems in a high fidelity and realistic operating environment.

B. Program Change Summary (\$ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Previous President's Budget	163.694	0.000	0.000	0.000	0.000
Current President's Budget	154.237	0.000	0.000	0.000	0.000
Total Adjustments	-9.457	0.000	0.000	0.000	0.000
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	-3.885	0.000			
• SBIR/STTR Transfer	-5.572	0.000			
• Other Adjustments	0.000	0.000	0.000	0.000	0.000

Change Summary Explanation

N/A.

C. Accomplishments/Planned Programs (\$ in Millions)	FY 2020	FY 2021	FY 2022
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Title: Acquisition Strategy Development & Source Selection	2.022	0.000	0.000
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Description: Develop and refine the PTS acquisition strategy for rapid prototyping and fielding of hostable payloads with rideshare opportunities, free-flyer satellite bus configurations, and other potential solutions. This includes developing the request for prototype proposals to enable competitive selection of up to four payload prime contractors. In parallel to preparing for the competitive selection, the Air Force is developing strategies for the acquisition of commodity buses, ground segment software and hardware, gateway segment terminals and equipment, risk reduction projects, and other supporting activities.

FY 2021 Plans:

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force		Date: May 2021		
Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>		R-1 Program Element (Number/Name) PE 1206761F / <i>Protected Tactical Service (PTS)</i>		
C. Accomplishments/Planned Programs (\$ in Millions)		FY 2020	FY 2021	FY 2022
N/A				
FY 2022 Plans: N/A				
Title: Technical Baseline Management and System Integration		25.846	0.000	0.000
Description: Perform Government as system integrator function through acquiring, designing, testing, and integrating key prototype segments and interfaces. Mature technical baseline and interface requirements for the prototype system. Conduct architectural engineering and system level integration planning for the PTS space, ground, and gateway segments. Support, configure, and conduct integrated testing of the major PTS subsystems, segments, and end-to-end prototype system. Manage the PTS open system architecture, refine interface requirements, and validate concept of operations through integrated system performance demonstrations. Beginning in FY 2021, the Space Hub End Cryptographic Unit (ECU) will be a separate thrust as a key risk mitigation project.				
FY 2021 Plans: N/A				
FY 2022 Plans: N/A				
Title: PTS Rapid Prototype Design and Development		126.369	0.000	0.000
Description: Rapid prototyping of PTS space, ground, and gateway segments and key system components. Develop, demonstrate, test, and evaluate PTS hardware and software systems. Design and develop modular, scalable payloads to support hosted or free-flyer configurations. Demonstrate prototype payload performance on-orbit. Evaluate PTS concept of operations with user participation and enable potential residual operational capability. Mature and validate user requirements. Continue prototyping and risk reduction efforts.				
FY 2021 Plans: N/A				
FY 2022 Plans: N/A				
Accomplishments/Planned Programs Subtotals		154.237	0.000	0.000
D. Other Program Funding Summary (\$ in Millions)				
N/A				

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force Date: May 2021

Appropriation/Budget Activity 3600: Research, Development, Test & Evaluation, Air Force I BA 4: Advanced Component Development & Prototypes (ACD&P)	R-1 Program Element (Number/Name) PE 1206761F I Protected Tactical Service (PTS)
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D. Other Program Funding Summary (\$ in Millions)

Remarks

E. Acquisition Strategy

The PTS team utilizes the FY 2016 National Defense Authorization Act Section 804 guidance for Rapid Prototyping/Rapid Fielding and Section 815 OTA guidance in developing the acquisition strategy. This strategy places an emphasis on the rapid prototyping, production, and incremental iteration of PTS capability. This strategy takes the form of a series of successively honed and tailored spirals, focusing on payload development and hosting opportunities and incorporating lessons learned from Milstar, Enhanced Polar System (EPS), EPS-Recapitalization, Advanced Extremely High Frequency, PTES, and commercial SATCOM practices.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 1206761F / Protected Tactical Service (PTS)	Project (Number/Name) 643728 / Protected Tactical SATCOM
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Product Development (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Protected Tactical SATCOM Rapid Prototyping (up to four contractors)	C/TBD	TBD : TBD	-	102.291	Nov 2019	-		-		-		-	-	-	-
Space Hub End Cryptographic Unit (ECU)	C/CPIF	L3Harris East : Camden, NJ	-	23.905	Jan 2020	-		-		-		-	-	-	-
Technical Mission Analysis	MIPR	Aerospace : El Segundo, CA	-	7.113	Nov 2019	-		-		-		-	-	-	-
Enterprise SE&I	Various	Various : Various	-	10.309	Jan 2020	-		-		-		-	-	-	-
Subtotal			-	143.618		-		-		-		-	-	-	N/A

Management Services (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
FFRDC	MIPR	Aerospace : El Segundo, CA	-	1.267	Nov 2019	-		-		-		-	-	-	-
Other Support	Various	Various : Various	-	0.024	Nov 2019	-		-		-		-	-	-	-
A&AS	Various	Various : Various	-	9.328	Nov 2019	-		-		-		-	-	-	-
Subtotal			-	10.619		-		-		-		-	-	-	N/A

Project Cost Totals	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
	-	154.237	0.000	-	-	-	-	-	N/A

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 1206761F / <i>Protected Tactical Service (PTS)</i>	Project (Number/Name) 643728 / <i>Protected Tactical SATCOM</i>

FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

Hostable Protected Tactical PL	
Technical Baseline Management and Integration	██████████
Acquisition Strategy Development and Source Selection	██████
Risk Reduction and Prototyping Concept Development (Includes SpEC OT)	██████
Space Hub End Cryptographic Unit (ECU)	██████████
Rapid Prototyping Spiral Contract/Agreement Award (up to four contractors)	███
Space Hub ECU Preliminary Design Review (PDR)	██
Rapid Prototyping Spiral PTS System Prototype Design & Development	██████████
Ground and Gateway Segments	██████████
Gateway Segment Authority to Proceed	██
Space Hub ECU Critical Design Review (CDR)	██

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Exhibit R-4A, RDT&E Schedule Details: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 1206761F / <i>Protected Tactical Service (PTS)</i>	Project (Number/Name) 643728 / <i>Protected Tactical SATCOM</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>Hostable Protected Tactical PL</i>				
Technical Baseline Management and Integration	1	2020	4	2020
Acquisition Strategy Development and Source Selection	1	2020	2	2020
Risk Reduction and Prototyping Concept Development (Includes SpEC OT)	1	2020	2	2020
Space Hub End Cryptographic Unit (ECU)	1	2020	4	2020
Rapid Prototyping Spiral Contract/Agreement Award (up to four contractors)	1	2020	1	2020
Space Hub ECU Preliminary Design Review (PDR)	2	2020	2	2020
Rapid Prototyping Spiral PTS System Prototype Design & Development	1	2020	4	2020
Ground and Gateway Segments	2	2020	4	2020
Gateway Segment Authority to Proceed	3	2020	3	2020
Space Hub ECU Critical Design Review (CDR)	3	2020	3	2020

Note

SpEC OT: Space Enterprise Consortium Other Transaction

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 1206855F / <i>Evolved Strategic SATCOM (ESS)</i>
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COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
Total Program Element	-	161.882	0.000	0.000	0.000	0.000	-	-	-	-	-	-
643725: <i>Evolved Strategic SATCOM (ESS)</i>	-	161.882	0.000	0.000	0.000	0.000	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-	-	-

A. Mission Description and Budget Item Justification

In FY 2021, PE 1206855F, Evolved Strategic SATCOM (ESS) efforts were transferred to Appropriation 3620, Research, Development, Test & Evaluation, Space Force, PE 1206855SF, Evolved Strategic SATCOM (ESS) from Appropriation 3600, Budget Activity 04 due to creation of a new Appropriation for Space Force.

The ESS system continues the strategic SATCOM mission of the Advanced Extremely High Frequency (AEHF) program by providing space and mission control segments for worldwide and arctic DoD strategic, secure, jam-resistant, survivable communications for ground, sea, and air assets. ESS will meet the requirements for strategic communications and capability gaps identified in the Protected Satellite Communications Services (PSCS) Analysis of Alternatives (AoA), the Protected Follow-on for Resiliency (PAFR) Study and the Strategic Tiger Team. The ESS architecture and functionality will be designed in accordance with the United States Strategic Command's signed ESS Concept of Operations and the Joint Requirements Oversight Council's validated Capability Development Document (CDD) satisfying the legacy AEHF strategic requirements and mission performance with enhancements for increased resiliency and cybersecurity.

ESS will support strategic mission requirements to provide the National Command Authority (NCA) and Combatant Commanders with highly-reliable, secure Military Satellite Communications. ESS will support the forecasted strategic demand in all operational environments and will be compatible with the existing architectures. The ESS system will satisfy emerging requirements using modular open system approaches to support incremental enhancements.

For more rapid and resilient strategic capability risk reduction, the ESS Program Office is executing its approved Space Segment acquisition strategy that leverages Middle Tier Acquisition authorities from the National Defense Authorization Act of 2016 for rapid prototyping, while maintaining the continuity of the AEHF strategic mission that interfaces operationally within the existing architecture.

Activities for the ESS ground segment acquisition includes evolving and enhancing existing ground segment, space-to-ground segment integration, and modernization in support of Enterprise Ground Services compatibility, in accordance with the acquisition strategies and schedules.

Space acquisition must respond with speed and agility to emerging adversary threats. Space & Missile Systems Center (SMC) has transformed the organization and implementation of space acquisition to an enterprise approach, maximizing innovation and resiliency, leveraging international, commercial, and mission partnerships, and managing program/project priorities according to an integrated unclassified/classified enterprise space architecture. Expanding the appropriate acquisition authorities and contract mechanisms to deliver capability sooner, SMC will strategically execute experimentation, prototyping, risk reduction, and other efforts to develop new or repurpose capabilities.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force	Date: May 2021
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Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 1206855F / <i>Evolved Strategic SATCOM (ESS)</i>
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This program element may include necessary civilian pay expenses required to manage, execute, and deliver ESS weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program elements 1206392F and 1206398F.

This effort is in Budget Activity 4, Advanced Component Development and Prototypes (ACD&P), because efforts are necessary to evaluate integrated technologies, representative modes or prototype systems in a high fidelity and realistic operating environment.

B. Program Change Summary (\$ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Previous President's Budget	167.206	0.000	0.000	0.000	0.000
Current President's Budget	161.882	0.000	0.000	0.000	0.000
Total Adjustments	-5.324	0.000	0.000	0.000	0.000
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	-5.324	0.000			
• Other Adjustments	0.000	0.000	0.000	0.000	0.000

C. Accomplishments/Planned Programs (\$ in Millions)	FY 2020	FY 2021	FY 2022
Title: Technical Baseline and Architectural Engineering	0.000	0.000	0.000
Description: The PSCS AoA, PAFR study, and Space Enterprise Vision study further defined the need for a more resilient, protected space architecture. ESS will support the strategic demand in all operational environments. Develop the technical baseline and conduct architectural engineering. Protected Tactical Waveform accommodation is not included in the current ESS CDD.			
FY 2021 Plans: N/A			
FY 2022 Plans: N/A			
Title: Acquisition Strategy and Space Segment Prototyping Preparation Activities	4.024	0.000	0.000
Description: In accordance with concept and architecture studies, ESS is conducting market research and working with Air Force Space Command (AFSPC) to define system requirements in support of acquisition strategy development. Increase in program			

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force		Date: May 2021		
Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>		R-1 Program Element (Number/Name) PE 1206855F / <i>Evolved Strategic SATCOM (ESS)</i>		
C. Accomplishments/Planned Programs (\$ in Millions)		FY 2020	FY 2021	FY 2022
office support for developing documentation and planning for activities leading up to and including a draft and final Request for Proposal (RFP) release and source selection. Finalize space segment acquisition activities for rapid, competitive prototyping with capability demonstration for up to three contractors leading up to, but not including, contract awards. FY 2021 Plans: N/A FY 2022 Plans: N/A				
Title: Space Segment Prototyping Description: Award up to three competitive rapid-prototyping contracts. Invest in technology and demonstrations that enables continued development of modernized, strategic payload and other key technology prototypes, risk reduction, and space segment design. Enables long-term return on investment and energizes industrial base for Strategic SATCOM, increased competition, promotion of innovation, and increased resiliency. Actively manage contractors through prototyping, demonstration and requirements/criteria needed for contractors to competitively bid on the ESS space segment Build, Integration and Test (I&T) and Delivery follow-on. FY 2021 Plans: N/A FY 2022 Plans: N/A		137.844	0.000	0.000
Title: ESS Ground Segment and Space-to-Ground Integration Description: Develop and field the ESS ground segment, to include Mission Planning, Command and Control and other architecture and activities required to support the ESS space segment. Includes interoperability with the existing architectures and interfaces for EGS compatibility. Provide for space-to-ground (system) and mission integration for the ESS system. FY 2021 Plans: N/A FY 2022 Plans: N/A		20.014	0.000	0.000
Accomplishments/Planned Programs Subtotals		161.882	0.000	0.000

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 1206855F / <i>Evolved Strategic SATCOM (ESS)</i>	
D. Other Program Funding Summary (\$ in Millions) N/A		
Remarks		
E. Acquisition Strategy <p>The Milestone Decision Authority (MDA) designated ESS Space Segment as an FY 2016 National Defense Authorization Act Middle Tier Acquisition (Rapid Prototyping) activity and approved the ESS acquisition strategy on 14 December 2018. A rapid prototyping phase effectively replaces the Technology Maturation and Risk Reduction phase from a traditional acquisition under Department of Defense 5000 series Directives and Instructions. This approach will award up to three contracts in FY2020 to focus on reducing space segment risks with the objective of maximizing ESS demonstrated capability for the payload and other key technologies. An ESS Program Office-led RFP and source selection will determine which space prototyping contractor, via their performance during the rapid prototyping phase, is positioned for the space segment Build, I&T and Delivery follow-on. The space prototyping contractors will be carried through the follow-on (Build, I&T and Delivery) source selection to continue momentum until the follow-on contract is awarded.</p> <p>Return on investment from space prototyping will energize the industrial base and increase competition in strategic SATCOM; inject innovative technical, process and integration approaches; burn down risk early and identify/correct issues as early as possible; and decrease traditional fielding timelines to support a more resilient and responsive architecture against emerging threats. Success in the competitive rapid-prototyping determines and informs follow-on Build, I&T and Delivery.</p> <p>The initial Ground Segment Acquisition Strategy was approved by the Program Executive Officer (PEO) in 4th Quarter FY 2019 to begin early technology readiness studies for ESS Phase 1 Mission Planning in FY 2020. Final approval for Mission Planning to begin architectural design and development/production may require additional approval and authority designation by the MDA. In-Band and Out-of-Band Command and Control studies are underway to best evolve these systems that are currently under sustainment.</p> <p>A Space Segment Payload ECU acquisition strategy will be delivered to the PEO for approval in FY 2021.</p>		

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 1206855F / Evolved Strategic SATCOM (ESS)	Project (Number/Name) 643725 / Evolved Strategic SATCOM (ESS)
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Product Development (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Space Segment Prototyping	C/FFP	Various : Various	-	110.613	Sep 2020	-		-		-		-	-	-	-
Ground Segment and Space-to-Ground Integration	C/FFP	Various : Various	-	18.939	Nov 2019	-		-		-		-	-	-	-
Technical Mission Analysis	MIPR	Aerospace : El Segundo, CA	-	7.134	Nov 2019	-		-		-		-	-	-	-
Enterprise SE&I	C/CPAF	Linquest : Los Angeles, CA	-	9.468	Nov 2019	-		-		-		-	-	-	-
Subtotal			-	146.154		-		-		-		-	-	-	N/A

Management Services (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
FFRDC	Various	Various : Various	-	4.533	Nov 2019	-		-		-		-	-	-	-
Other Support	Various	Various : Various	-	0.150	Oct 2019	-		-		-		-	-	-	-
A&AS	Various	Various : Various	-	11.045	Nov 2019	-		-		-		-	-	-	-
Subtotal			-	15.728		-		-		-		-	-	-	N/A

Project Cost Totals	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
	-	161.882	0.000	-	-	-	-	-	N/A

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 1206855F / <i>Evolved Strategic SATCOM (ESS)</i>	Project (Number/Name) 643725 / <i>Evolved Strategic SATCOM (ESS)</i>

	FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
ESS Development																												
System and Mission Integration																												
Space Segment Prototyping - Planning																												
Space Segment Prototyping - Contract Awards (up to 3 contractors)																												
Space Segment Prototyping - Execution (up to 3 contractors)																												
Ground Segment - In and Out-of-Band Command and Control efforts																												
Ground Segment - Phase 1 Mission Planning Technology Readiness																												

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Exhibit R-4A, RDT&E Schedule Details: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 1206855F / <i>Evolved Strategic SATCOM (ESS)</i>	Project (Number/Name) 643725 / <i>Evolved Strategic SATCOM (ESS)</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>ESS Development</i>				
System and Mission Integration	1	2020	4	2020
Space Segment Prototyping - Planning	1	2020	3	2020
Space Segment Prototyping - Contract Awards (up to 3 contractors)	4	2020	4	2020
Space Segment Prototyping - Execution (up to 3 contractors)	4	2020	4	2020
Ground Segment - In and Out-of-Band Command and Control efforts	1	2020	4	2020
Ground Segment - Phase 1 Mission Planning Technology Readiness	1	2020	4	2020

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 1206857F / <i>Space Rapid Capabilities Office</i>
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COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
Total Program Element	-	25.957	0.000	0.000	0.000	0.000	-	-	-	-	-	-
64A020: <i>AF Funded ORSSats</i>	-	25.957	0.000	0.000	0.000	0.000	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-	-	-

Note
PE 1206857F, Space Rapid Capabilities Office, changed from Operationally Responsive Space

A. Mission Description and Budget Item Justification

In FY 2021, PE 1206857F, Space Rapid Capabilities Office efforts were transferred to Appropriation 3620, Research, Development, Test & Evaluation, Space Force, PE 1206857SF, Space Rapid Capabilities Office from Appropriation 3600, Budget Activity 04 due to the creation of a new Appropriation for Space Force.

The Space Rapid Capabilities Office (Space RCO) mission is to expedite the development and fielding of operationally focused capabilities for immediate and near-term needs as directed by the Space RCO Board of Directors (BoD). Key operating principles include a short and narrow chain of command, overarching programmatic insight, early and prominent war fighter involvement, and small integrated teams within a single office to rapidly augment existing space capabilities when needed, to expand operational capability, reconstitute/replenish/protect critical space capabilities to reserve "continuity of operations" capability, and exploit space technological or operational innovations to increase U.S. advantage.

The Space RCO is ready to develop, test, train, and equip war fighter needs as they are identified at any time. First, the requirements must be validated by the commander, USSTRATCOM, acting through U.S. Space Command; second, the project must be approved by the Space RCO BoD; third, the project will be executed by the Space RCO. If the effort is initiated during execution year, it will be described in the next year's budget exhibit.

Space RCO is supporting the Air Force Research Lab (AFRL) developed Space Solar Power project to collect solar energy and provide uninterrupted, assured, and logistically agile power to expeditionary forces operating in unimproved areas such as forward operating bases. AFRL formulated the Space Solar Power Incremental Demonstrations and Research (SSPIDR) project to rapidly demonstrate this innovative technology via a series of integrated demos and technology development/maturation efforts.

Space RCO is supporting Special Operations Forces-Space (SOF-Space) for Joint Special Operations Command (JSOC) until it's transferred to JSOC in FY 2021. SOF developments include visionary, tailored, and future Space/Cyber projects as well as to plan, develop, test and transition advanced technologies into space system prototypes and capabilities to meet known and emerging threats. Conduct architecture studies, modeling and simulation, technical development, integration and test activities in preparation for transition of critical technologies into prototype or space program of record.

In addition, Space RCO will conduct studies and analysis for future programs to support the BoD.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force	Date: May 2021
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Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 1206857F / <i>Space Rapid Capabilities Office</i>
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This program element may include necessary civilian pay expenses required to manage, execute, and deliver Space RCO weapon system capabilities. The use of such program funds would be in addition to the civilian pay expenses budgeted in program elements 1206392F and 1206398F.

This effort is in Budget Activity 4, Advanced Component Development and Prototypes (ACD&P), because efforts are necessary to evaluate integrated technologies, representative modes or prototype systems in a high fidelity and realistic operating environment.

B. Program Change Summary (\$ in Millions)	<u>FY 2020</u>	<u>FY 2021</u>	<u>FY 2022 Base</u>	<u>FY 2022 OCO</u>	<u>FY 2022 Total</u>
Previous President's Budget	26.885	0.000	0.000	0.000	0.000
Current President's Budget	25.957	0.000	0.000	0.000	0.000
Total Adjustments	-0.928	0.000	0.000	0.000	0.000
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	-0.928	0.000			
• Other Adjustments	0.000	0.000	0.000	0.000	0.000

C. Accomplishments/Planned Programs (\$ in Millions)	<u>FY 2020</u>	<u>FY 2021</u>	<u>FY 2022</u>
<p>Title: Space RCO Board of Directors (BoD) Projects, Studies, and Analysis</p> <p>Description: Execute projects, studies, and analysis under rapid acquisition authorities inherent to the Space RCO, that address emergent capabilities and respond to validated requirements and other BoD approved efforts to meet needs in year of execution. In addition, provide systems engineering, program management support and civilian pay across all the Space RCO activities as well as perform modeling, simulation, analysis, and assess alternative concepts and requirements.</p> <p>FY 2021 Plans: N/A</p> <p>FY 2022 Plans: N/A</p> <p>FY 2021 to FY 2022 Increase/Decrease Statement: N/A</p>	8.713	0.000	0.000
<p>Title: Space Related Tactical Communications and Cyber Enhancements for SOF</p>	17.244	0.000	0.000

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force	Date: May 2021
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Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 1206857F / <i>Space Rapid Capabilities Office</i>
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C. Accomplishments/Planned Programs (\$ in Millions)	FY 2020	FY 2021	FY 2022
<p>Description: Provides enhanced communication and cyber capabilities to support tactical operations by Quick Reaction Forces (QRF) and Special Operations Forces (SOF).</p> <p>FY 2021 Plans: N/A</p> <p>FY 2022 Plans: N/A</p> <p>FY 2021 to FY 2022 Increase/Decrease Statement: N/A</p>			
Accomplishments/Planned Programs Subtotals	25.957	0.000	0.000

D. Other Program Funding Summary (\$ in Millions)

N/A

Remarks

E. Acquisition Strategy

Expediently award contracts through Space RCO or partner organizations.

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Exhibit R-4, RDT&E Schedule Profile: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 1206857F / <i>Space Rapid Capabilities Office</i>	Project (Number/Name) 64A020 / <i>AF Funded ORSSats</i>

	FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

<i>Space Rapid Capabilities Office</i>	
Space RCO Board of Directors (BoD) Projects, Studies, and Analysis	██████████
Space Related Tactical Communications and Cyber Enhancements for SOF	██████████

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Exhibit R-4A, RDT&E Schedule Details: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 1206857F / <i>Space Rapid Capabilities Office</i>	Project (Number/Name) 64A020 / <i>AF Funded ORSSats</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>Space Rapid Capabilities Office</i>				
Space RCO Board of Directors (BoD) Projects, Studies, and Analysis	2	2020	4	2020
Space Related Tactical Communications and Cyber Enhancements for SOF	3	2020	4	2020

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 0604200F / <i>Future Advanced Weapon Analysis & Programs</i>
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COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
Total Program Element	-	4.993	22.894	23.499	0.000	23.499	-	-	-	-	-	-
653133: <i>Armament Subsystems</i>	-	4.993	22.894	23.499	0.000	23.499	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-	-	-

A. Mission Description and Budget Item Justification

This program provides a responsive design and development engineering infrastructure to address emerging issues and technology insertion/technology application on legacy systems, and supports analysis to develop new capability systems, improve legacy systems, or determine feasibility of utilizing prototypes with advanced technology on fielded systems. Efforts will identify methods to improve system performance, develop potential future designs, mitigate evolving threats, reduce life cycle costs, develop/expand modeling/simulation and experimental platforms for weapon qualification activities, improve safety, and ensure both viability and durability of tactical missile systems. Results enable highly informed decisions on acquisition initiatives to develop, refine, and rapidly integrate emerging technologies into new weapons concepts or existing aircraft munitions which include, but are not limited to, multi-role missile development, advanced long-range weapon capabilities, advanced propulsion systems technologies, non-kinetic and directed energy technologies, warheads, fuzes, and tailkits to address warfighter, Air Staff and OSD initiatives and strategies.

In order to accomplish the above objectives, this program may accomplish pre-acquisition planning and systems engineering, risk reducing prototype missile design work, aircraft integration, prototype ground & flight tests, pre-planning and execution of Joint Capability Technology Demonstrations (JCTD), development and prototyping of threat emulations, simulations, presentation of evolving threat scenarios, target area environments to prepare for emerging weapons development activities, and program management support.

Finally, this program also conducts high fidelity Modeling, Simulation and Analysis (MS&A) to support the development, testing and evaluating of future concept and legacy weapons. The MS&A work includes physics-level, engineering-level, and engagement/mission-level modeling, simulation and analysis.

The FY 2022 funding request was reduced by \$1.315 million to account for the availability of prior year execution balances.

This program element may include necessary emergent or unanticipated civilian pay expenses required to manage, execute, and deliver Future Advanced Weapon Systems capabilities for emergent or unanticipated weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program element 0605831F.

This program is in Budget Activity 5, System Development and Demonstration (SDD) because it has passed Milestone B approval and is conducting engineering and manufacturing development tasks aimed at meeting validated requirements prior to full rate production.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force	Date: May 2021
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Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 0604200F / <i>Future Advanced Weapon Analysis & Programs</i>
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B. Program Change Summary (\$ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Previous President's Budget	5.000	25.161	46.330	0.000	46.330
Current President's Budget	4.993	22.894	23.499	0.000	23.499
Total Adjustments	-0.007	-2.267	-22.831	0.000	-22.831
• Congressional General Reductions	0.000	-0.042			
• Congressional Directed Reductions	0.000	-2.225			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	-0.007	0.000			
• Other Adjustments	0.000	0.000	-22.831	0.000	-22.831

Change Summary Explanation

FY21 Appropriation Conference Mark -\$2.225M RDT&E for "Improving funds management: Forward financing". FY22 reduction due to program rephase.

C. Accomplishments/Planned Programs (\$ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Title: Capability Strategy Development	3.648	12.485	12.583	0.000	12.583
Description: Plan and execute early Systems Engineering, concept studies, trade space analyses, modeling & simulation, portfolio acquisition planning, agile acquisition strategies, and risk reduction activities for future advanced weapon systems to defeat evolving threat scenarios and environments. Provides security, workspace/seating, and information technology capabilities to support mission needs.					
FY 2021 Plans: Complete requirements definition via concept studies, engagement level analyses, and develop initial acquisition strategies for Affordable Mass Weapons. Complete engagement-level and begin mission-level trade space analyses for Defensive Weapons. Incorporate Weapon Open System Architecture development and digital engineering into Affordable Mass, Defensive Weapons, and future air-to-air weapon concept studies and acquisition planning. Continue directed energy and non-kinetic technology transition activities. Begin pre-acquisition and systems engineering activities of future air-breathing hypersonic weapons.					
FY 2022 Base Plans: Conduct requirements analysis for Air Superiority, Global Precision Attack, and Base Defense efforts. Evaluate industry implementation of kinetic weapon open system architecture for a candidate initiative. Collaborate with OSD (R&E), Army, and Navy to develop a common directed energy weapon open system architecture. Begin					

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force				Date: May 2021	
Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 5: System Development & Demonstration (SDD)</i>		R-1 Program Element (Number/Name) PE 0604200F / <i>Future Advanced Weapon Analysis & Programs</i>			
C. Accomplishments/Planned Programs (\$ in Millions)					
Trade Space Analysis Framework to characterize operational context and desired material system attributes for weapon related capability gaps. Provide weapon effectiveness analyses and capability development strategies to senior leaders for future weapons investment planning and wargames.					
FY 2022 OCO Plans: None					
FY 2021 to FY 2022 Increase/Decrease Statement: Funding increased due to multiple industry contracts to support implementation and evaluation of open system architecture in a candidate weapon initiative and other parallel weapon development efforts.					
Title: Rapid Prototyping					
Description: Conduct rapid acquisition/prototyping efforts and Modeling, Simulation, and Analysis (MS&A) validated through integration of empirical data derived from prototypes and demonstrations.					
FY 2021 Plans: Acquire and modify test assets for demo of a defensive weapon. Conduct Phase I flight test and analysis of a defensive weapon. Complete Phase II test design and planning. Design and flight test a derivative prototype of an Affordable Mass Weapon concept for a second mission using digital engineering.					
FY 2022 Base Plans: Prototyping of Global Precision Attack and Base Defense weapon concepts to demonstrate feasibility of key attributes. Begin coordination of test planning with key MAJCOM and COCOM stakeholders.					
FY 2022 OCO Plans: None					
FY 2021 to FY 2022 Increase/Decrease Statement: Funding increased due to multiple prototyping defensive weapons demos and follow-on industry studies.					
Title: Digital Foundation					
Description: Provides model-based systems engineering, modeling & simulation (M&S), data analysis tool suites, and associated software engineering expertise to support weapons capability strategy development and rapid prototyping. Provides Validation & Verification (V&V) of contractor M&S models and tools. Develops Guidance, Navigation, and Control (GNC) and weapon survivability analysis capabilities. Creates and maintains					
	0.799	5.064	5.442	0.000	5.442
	0.422	2.679	2.764	0.000	2.764

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force	Date: May 2021
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Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 0604200F / <i>Future Advanced Weapon Analysis & Programs</i>
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C. Accomplishments/Planned Programs (\$ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
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<p>a searchable electronic weapons database. Develops and evaluates future weapon open system architectures and digital engineering tools.</p> <p>FY 2021 Plans: Maintain weapons analysis repository database. Update trade space analysis framework to enable online collaboration with other government agencies. Employ newly developed digital foundation to support weapon capability strategy development.</p> <p>FY 2022 Base Plans: Maintain weapons analysis repository database. Continue updates to trade space analysis framework to enable online collaboration with other government agencies. Maintain developed digital foundation to support weapon capability strategy development. Conduct weapon lethality and survivability analyses.</p> <p>FY 2022 OCO Plans: None</p> <p>FY 2021 to FY 2022 Increase/Decrease Statement: Funding increased due to building additional M&S capabilities, models, and tools.</p>					
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<p>Title: Industry Connectivity</p> <p>Description: Enables Air Force outreach to small and large businesses to solicit innovative material solutions for future weapon initiatives. This includes planning and execution activities for the development of campaign analysis, rapid innovation events, communicating technology needs at industry conferences (i.e. Weapons Conference, Air Force Association Symposium), and evaluating industry submissions for innovative technologies. Demonstrate potential utility of innovative technologies from Small Business Innovation Research (SBIR) contracts, campaign analyses, experiments, and prototypes.</p> <p>FY 2021 Plans: Conduct annual AF Armament Futures Workshop, Innovation Event, Threat Day, and Pitch Days for small and large businesses. Develop future agendas based on participant feedback and informed by capability strategy development weapons roadmap activities.</p> <p>FY 2022 Base Plans:</p>	0.124	2.666	2.710	0.000	2.710
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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force	Date: May 2021
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Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 0604200F / <i>Future Advanced Weapon Analysis & Programs</i>
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C. Accomplishments/Planned Programs (\$ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Conduct annual AF Armament Futures Workshop, Innovation and Industry Day events for small and large businesses, and Threat Day. Develop future agendas based on participant feedback and informed by capability strategy development weapons roadmap activities. FY 2022 OCO Plans: None FY 2021 to FY 2022 Increase/Decrease Statement: Funding increased due to additional Innovation Day and Industry Days events.					
Accomplishments/Planned Programs Subtotals	4.993	22.894	23.499	0.000	23.499

D. Other Program Funding Summary (\$ in Millions)
N/A

Remarks

E. Acquisition Strategy
Accomplish studies, analyses, concept development and engineering; efforts will be conducted using contracting strategies deemed most appropriate, generally using competitive contracts and/or other obligating documentation considered most appropriate by obligating and performing agencies involved.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 0604200F / <i>Future Advanced Weapon A</i> <i>nalysis & Programs</i>	Project (Number/Name) 653133 / <i>Armament Subsystems</i>
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Product Development (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Directed Energy Studies	MIPR	AFRL : Various	-	1.250	Jul 2020	0.400	Jul 2021	-		-		-	-	-	-
Prototype Vehicle Development & Integration	C/Various	AFLCMC/EB : Eglin AFB, FL	-	1.480	May 2020	-		3.322	Jul 2022	-		3.322	-	-	-
Affordable Mass & Concept Studies	C/TBD	TBD : TBD	-	0.250	Jul 2020	0.203	Jul 2021	3.528	Jan 2022	-		3.528	-	-	-
Future Weapons Open System Architecture	TBD	TBD : Various	-	-		1.361	Apr 2021	0.478	Jan 2022	-		0.478	-	-	-
Subtotal				-		2.980		1.964		7.328		7.328	-	-	N/A

Support (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Systems Engineering & Studies Support	C/Various	AFLCMC/EB : Eglin AFB, FL	-	0.536	Jun 2020	5.901	Jun 2021	4.016	Jun 2022	-		4.016	-	-	-
Modeling & Simulation Licenses & Support	C/Various	AFLCMC/EB : Eglin AFB, FL	-	0.500	May 2020	0.613	May 2021	1.008	May 2022	-		1.008	-	-	-
Subtotal				-		1.036		6.514		5.024		5.024	-	-	N/A

Test and Evaluation (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Government Test and Evaluation	MIPR	Various : Various	-	0.216	Nov 2020	7.288	Apr 2021	3.120	Feb 2022	-		3.120	-	-	-
Subtotal				-		0.216		7.288		3.120		3.120	-	-	N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 0604200F / <i>Future Advanced Weapon A</i> <i>alysis & Programs</i>	Project (Number/Name) 653133 / <i>Armament Subsystems</i>
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Management Services (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Government Program Management Administration	Various	Various : Eglin AFB, FL	-	0.761	Dec 2019	7.128	Dec 2020	8.027	Dec 2021	-		8.027	-	-	-
Subtotal			-	0.761		7.128		8.027		-		8.027	-	-	N/A

Remarks
Includes A&AS contract, IT requirements, travel, and office supplies.

	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	-	4.993	22.894	23.499	-	23.499	-	-	N/A

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 0604200F / <i>Future Advanced Weapon A nalysis & Programs</i>	Project (Number/Name) 653133 / <i>Armament Subsystems</i>

FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

Capability Strategy Development	
Air Superiority, Global Precision Attack, and Base Defense Requirements Analyses	
Future Weapons Open System Architecture	
Trade Space Analysis Framework	
Rapid Prototyping	
Global Precision Attack Weapon Demos	
Base Defense Weapon Demos	
Digital Foundation	
Lethality, GNC & Survivability Modeling, Simulation and Analysis	
Analysis Database Repository	
Model-Based Systems Engineering Foundation	
Weapon Open System Architecture Built-In	
Industry Connectivity	
Futures Workshops, Concepts Studies	
Threat Day Events, Innovation Days	

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Exhibit R-4A, RDT&E Schedule Details: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 0604200F / <i>Future Advanced Weapon Analysis & Programs</i>	Project (Number/Name) 653133 / <i>Armament Subsystems</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
Capability Strategy Development				
Air Superiority, Global Precision Attack, and Base Defense Requirements Analyses	2	2021	4	2026
Future Weapons Open System Architecture	3	2021	4	2026
Trade Space Analysis Framework	2	2021	4	2026
Rapid Prototyping				
Global Precision Attack Weapon Demos	2	2021	4	2026
Base Defense Weapon Demos	2	2021	4	2026
Digital Foundation				
Lethality, GNC & Survivability Modeling, Simulation and Analysis	1	2021	4	2026
Analysis Database Repository	2	2021	3	2026
Model-Based Systems Engineering Foundation	1	2021	4	2026
Weapon Open System Architecture Built-In	1	2021	2	2026
Industry Connectivity				
Futures Workshops, Concepts Studies	1	2021	4	2026
Threat Day Events, Innovation Days	2	2021	2	2026

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 0604201F / <i>PNT Resiliency, Mods, and Improvements</i>
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COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
Total Program Element	-	202.354	38.494	167.520	0.000	167.520	-	-	-	-	-	-
651030: <i>GPS Receiver Development</i>	-	202.354	38.494	167.520	0.000	167.520	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-	-	-

A. Mission Description and Budget Item Justification

Positioning, Navigation and Timing (PNT) solutions are critical to defense operations, enabling delivery of precision fires, safe aerial navigation, and time coordination across multiple platforms and subsystems. PNT must be maintained in the face of emerging and continuously evolving electronic and cyber threats, requiring increased system resiliency and rapid adaptability similar to that historically required of electronic warfare systems. Evolving threats will drive upgrades such as Global Positioning System (GPS) receiver modernization, development of standard navigational system formats/interfaces, increased use of open system architecture design principles, incorporation of alternative navigation sources into navigational solutions, advanced anti-jam antennas, antenna electronics, radio frequency monitoring/locating/reporting capabilities, and precision clock improvements to maintain current and future force capabilities.

Project 651030 includes Embedded GPS/Inertial Navigation System (INS) Modernized (EGI-M), Miniaturized Airborne GPS Receiver 2000 Modernization (MAGR-2K-M), Resilient GPS (R-EGI) development, anti-jam antenna/antenna electronics development, situational awareness devices, and other advanced/non-GPS PNT solutions. Activities also include, but are not limited to, current program planning, rapid prototyping/concept development, execution and future program planning and support to other GPS enabled systems as required. The PNT Resiliency, Mods, and Improvements (RMI) effort provides rapidly re-programmable application space for Alternate Satellite Navigation Systems User Equipment (UE), enabling agile and resilient response to GPS threat environments. Funds may be used to address emerging and short-notice Diminishing Manufacturing and Material Shortage (DMSMS) issues.

This requirement supports performance of a full financial audit as required by title 10 U.S.C. Chapter 9A, Sec 240-D.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver weapon system capability. The use of such programs funds would be in addition to the civilian pay expenses budgeted in program element 0605831F. In FY20 \$1.662M was expended for civilian pay expenses in this program element, and in FY21 \$1.231M is forecasted for civilian pay expenses in this program element.

BY funding totals include 134.622M requested for the Pacific Deterrence Initiative.

This program is in Budget Activity 5, System Development and Demonstration (SDD) because it has passed Milestone B approval and is conducting engineering and manufacturing development tasks aimed at meeting validated requirements prior to full rate production.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 0604201F / <i>PNT Resiliency, Mods, and Improvements</i>
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B. Program Change Summary (\$ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Previous President's Budget	142.782	38.564	50.923	0.000	50.923
Current President's Budget	202.354	38.494	167.520	0.000	167.520
Total Adjustments	59.572	-0.070	116.597	0.000	116.597
• Congressional General Reductions	0.000	-0.070			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	59.572	0.000			
• SBIR/STTR Transfer	0.000	0.000			
• Other Adjustments	0.000	0.000	116.597	0.000	116.597

Congressional Add Details (\$ in Millions, and Includes General Reductions)

Project: 651030: *GPS Receiver Development*

Congressional Add: *Program Increase - Embedded GPS/INS - Modernized (EGI-M)*

Congressional Add Subtotals for Project: 651030

Congressional Add Totals for all Projects

	FY 2020	FY 2021
	75.000	-
	75.000	-
	75.000	-

Change Summary Explanation

FY20 funding increased by 59.572M via reprogramming in order to cover FY21 funding movement due to higher Air Force priorities.

FY21 funding decreased by 0.07M due to general Congressional mark against RDT&E funds.

FY22 funding increased by 116.597M to fund M-Code receiver development in accordance with Department priorities.

C. Accomplishments/Planned Programs (\$ in Millions)

	FY 2020	FY 2021	FY 2022
Title: Embedded GPS/INS - Modernized (EGI-M)	72.054	0.000	89.420
Description: EGI-M is a combined INS/GPS aircraft position, navigation, and timing system. Program upgrades EGI design to enhance resiliency against existing and emerging navigational warfare threats, incorporating design features (such as interface standardization and software modularity) to incorporate alternative navigation and timing sources, where cost effective, to reduce DoD cost and time lines to respond to newly identified threats and maintain current force capabilities. Incorporates M-Code and Automatic Dependent Surveillance-Broadcast (ADS-B) compliance capability into EGI receivers while addressing parts			

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force		Date: May 2021		
Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 5: System Development & Demonstration (SDD)</i>		R-1 Program Element (Number/Name) PE 0604201F / <i>PNT Resiliency, Mods, and Improvements</i>		
C. Accomplishments/Planned Programs (\$ in Millions)		FY 2020	FY 2021	FY 2022
<p>obsolescence, reducing configuration count from 260+ to a desired end-state of 16, and decreasing production and sustainment costs.</p> <p>EGI-M has two prime contractors: Northrop Grumman and Honeywell.</p> <p>FY 2021 Plans: N/A</p> <p>FY 2022 Plans: Finalize production of Northrop Grumman Engineering Development Models (EDM) and conduct TRR on the Honeywell hardware design.</p> <p>FY 2021 to FY 2022 Increase/Decrease Statement: Funding increased in conjunction with planned receiver development activities for the EGI-M effort.</p>				
<p>Title: Miniaturized Airborne GPS Receiver 2000 - Modernized (MAGR-2K-M)</p> <p>Description: MAGR-2K-M is an aircraft GPS receiver. Program increases MAGR-2K-Legacy resiliency against existing and emerging navigational warfare threats while reducing cost and time lines to incorporate agile capabilities to respond to newly identified threats. Incorporates M-Code capability into MAGR-2K-Legacy receivers while addressing parts obsolescence and providing a pathway to ADS-B Out implementation. Performs appropriate trade studies and incorporates additional resiliency features, such as alternate navigation inputs, where cost effective. The Air Force and the Navy are the primary users of the MAGR-2K-M system.</p> <p>FY 2021 Plans: N/A</p> <p>FY 2022 Plans: Integrate Military GPS User Equipment (MGUE) software builds 6.2 and 6.3. Conduct anomaly resolution. Deliver balance of PRUs and upgrade previously delivered Production Representative Units (PRUs) to latest configuration. Initiate performance qualification testing, cyber testing, and developmental testing.</p> <p>FY 2021 to FY 2022 Increase/Decrease Statement: Funding increased in conjunction with planned receiver development activities for the MAGR-2K-M effort.</p>		3.800	0.000	25.200
<p>Title: PNT Resiliency, Mods, and Improvements (RMI)</p> <p>Description: Conduct studies and analysis of PNT systems and requirements, develop and evaluate alternative courses of action, identify, plan and conduct PNT technology transition projects, conduct prototype and acquisition program planning, and provide</p>		0.500	0.000	2.000

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force		Date: May 2021		
Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 5: System Development & Demonstration (SDD)</i>		R-1 Program Element (Number/Name) PE 0604201F / <i>PNT Resiliency, Mods, and Improvements</i>		
C. Accomplishments/Planned Programs (\$ in Millions)		FY 2020	FY 2021	FY 2022
<p>recommended solutions to DoD and Air Force decision makers relative to navigation warfare threat evolution and technology emergence. This includes work for more flexible Secure Software Defined Receiver User Equipment to capture other than GPS signals like Multi-Global Navigation Satellite Systems to include Navigation Technology Satellite-III.</p> <p>FY 2021 Plans: N/A</p> <p>FY 2022 Plans: Conduct studies and analysis of PNT systems and requirements.</p> <p>FY 2021 to FY 2022 Increase/Decrease Statement: Funding increased in conjunction with planned development activities for prototype efforts.</p>				
<p>Title: Resilient EGI (R-EGI)</p> <p>Description: Establishes a Government Reference Architecture (GRA) embodying open systems architecture concepts, enabling and accelerating the transition of future resilient PNT DoD systems. Enables design and development of various aircraft PNT Line Replaceable Units (LRUs) that are rapidly upgradeable to counter evolving threats. Demonstrates the GRA through prototyping of an open R-EGI LRU. Program matures, prototypes, and tests promising PNT technologies/systems and develops transition paths to flow new technologies into new and/or existing PNT systems. Provides improved PNT resiliency to counter navigational warfare threats through the design, development, test, and transition of science and technology efforts to PNT systems.</p> <p>FY 2021 Plans: Converge Phase I R-EGI LRU prototypes into Phase II R-EGI LRU "Best of Breed" prototypes while refining fabrication, testing, and design on functional demonstration prototypes. Continue development of hardware standards and software navigation protocols, aircraft data/communication networking protocols and advanced receiver designs. Continue to mature resilient hardware and software technologies into new and/or existing PNT systems.</p> <p>FY 2022 Plans: Complete detailed design spiral and produce the Detailed Design Prototype to allow initial integration into developmental testing labs and integration into platform labs. Build on knowledge gained through use of the Detailed Design Prototype in the final design spiral and produce the Production Representative Prototypes. Initiate Developmental Testing and Cyber Testing on the Production Representative Prototypes which starts the verification of the R-EGI LRU.</p> <p>FY 2021 to FY 2022 Increase/Decrease Statement:</p>		51.000	38.494	50.900

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force	Date: May 2021
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Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 0604201F / <i>PNT Resiliency, Mods, and Improvements</i>
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C. Accomplishments/Planned Programs (\$ in Millions)	FY 2020	FY 2021	FY 2022
Funding increased due to refinement of R-EGI LRU Production Representative Prototype design and prototype deliveries supporting Developmental and Operational Test.			
Accomplishments/Planned Programs Subtotals	127.354	38.494	167.520

	FY 2020	FY 2021
Congressional Add: Program Increase - Embedded GPS/INS - Modernized (EGI-M)	75.000	-
FY 2020 Accomplishments: EGI-M development, testing, and production engineering development models (EDM).		
Congressional Adds Subtotals	75.000	-

D. Other Program Funding Summary (\$ in Millions)

N/A

Remarks

E. Acquisition Strategy

Modify and modernize existing legacy PNT systems to incorporate major enhancements such as GPS M-Code, ADS-B out, and alternative PNT solutions to GPS while reducing lifecycle costs through common sustainment practices and economies of scale. Design, development, and testing efforts, to include the development of government owned reference architectures for rapid capability insertion, share a common PE to allow flexibility in funding and planning. Integration and operational testing of completed PNT solutions are accomplished by individual platforms and weapons systems. This approach uses a combination of cost-plus and fixed-price contract types based on acquisition phase and risk with a mix between competition and sole-source strategies. Modifications to legacy receivers are acquired via Engineering Change Proposals (ECP)/Task Orders on existing contracts. Other Transaction Authorities (OTA) and industry consortiums are used to support prototyping and open standards development for new PNT solutions.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 0604201F / PNT Resiliency, Mods, and Improvements	Project (Number/Name) 651030 / GPS Receiver Development
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Product Development (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
EGI-M #1 EMD	C/CPAF	Honeywell : Clearwater, FL	-	34.976	Jul 2020	-		59.420	Oct 2021	-		59.420	-	-	-
EGI-M #2 EMD	SS/CPFF	Northrop Grumman : Woodland Hills, CA	-	95.504	Oct 2019	-		30.000	Oct 2021	-		30.000	-	-	-
MAGR-2K-M	SS/CPFF	Raytheon : El Segundo, CA	-	3.800	Oct 2019	-		25.200	Oct 2021	-		25.200	-	-	-
PNT RMI	SS/CPFF	Collins Aerospace : Des Moines, IA	-	0.500	Oct 2019	-		0.500	Oct 2021	-		0.500	-	-	-
R-EGI	C/CPFF	IS4S : Huntsville, AL	-	51.000	Feb 2020	35.383	Oct 2020	41.500	Oct 2021	-		41.500	-	-	-
Subtotal			-	185.780		35.383		156.620		-		156.620	-	-	N/A

Support (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
EGI-M FFRDC	Various	MITRE Corp. : Bedford, MA	-	0.263	Sep 2020	-		-		-		-	-	-	-
R-EGI FFRDC	Various	MITRE Corp. : Bedford, MA	-	1.663	Sep 2020	1.925	Oct 2020	0.720	Oct 2021	-		0.720	-	-	-
Subtotal			-	1.926		1.925		0.720		-		0.720	-	-	N/A

Test and Evaluation (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
EGI-M	PO	Various : TBD	-	0.500	Oct 2019	-		-		-		-	-	-	-
MAGR-2K-M	PO	Various : TBD	-	0.400	Oct 2019	-		-		-		-	-	-	-
R-EGI	PO	Various : TBD	-	0.030	Nov 2019	0.500	Oct 2020	0.500	Oct 2021	-		0.500	-	-	-
Subtotal			-	0.930		0.500		0.500		-		0.500	-	-	N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 0604201F / PNT Resiliency, Mods, and Improvements	Project (Number/Name) 651030 / GPS Receiver Development
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Management Services (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Strategic Planning/PMA	C/Various	Whitney, Bradley & Brown : Robins, AFB, GA	-	13.718	Oct 2019	0.686	Oct 2020	9.680	Oct 2021	-		9.680	-	-	-
Subtotal			-	13.718		0.686		9.680		-		9.680	-	-	N/A
Project Cost Totals			-	202.354		38.494		167.520		-		167.520	-	-	N/A

Remarks
Funding increased in FY 2022 because of planned receiver development activities and to recover from the lack of funding in FY 2021.

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Exhibit R-4, RDT&E Schedule Profile: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 0604201F / <i>PNT Resiliency, Mods, and Improvements</i>	Project (Number/Name) 651030 / <i>GPS Receiver Development</i>

FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

PNT	
EGI-M #1 EMD (NGC)	
EGI-M #2 EMD (HI)	
MAGR-2K-M EMD	
MAGR-2K-M Testing	
R-EGI Prototyping	

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Exhibit R-4A, RDT&E Schedule Details: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 0604201F / <i>PNT Resiliency, Mods, and Improvements</i>	Project (Number/Name) 651030 / <i>GPS Receiver Development</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>PNT</i>				
EGI-M #1 EMD (NGC)	1	2020	1	2026
EGI-M #2 EMD (HI)	2	2020	1	2026
MAGR-2K-M EMD	1	2020	4	2023
MAGR-2K-M Testing	1	2020	4	2026
R-EGI Prototyping	1	2020	4	2023

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 0604222F / <i>Nuclear Weapons Support</i>
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COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
Total Program Element	-	4.249	26.057	30.050	0.000	30.050	-	-	-	-	-	-
654236: <i>Engineering Analysis</i>	-	2.335	4.458	4.531	0.000	4.531	-	-	-	-	-	-
654807: <i>Nuclear Weapon System Technology and Integration</i>	-	0.000	14.639	19.474	0.000	19.474	-	-	-	-	-	-
655708: <i>Nuclear Weapons Support</i>	-	1.914	6.960	6.045	0.000	6.045	-	-	-	-	-	-

A. Mission Description and Budget Item Justification

The Air Force Nuclear Weapons Center (AFNWC), Kirtland AFB, NM, is the primary executing agency for this program. The AFNWC is tasked with maintaining and providing technical expertise on all Air Force (AF) nuclear weapons and weapon systems. This program provides resources for technical and programmatic activities, which includes research, development, test, and evaluation of all nuclear-certified equipment/systems, as well as performing independent capability analyses on all AF nuclear weapons systems activities, including weapons development and sustainment; interoperability; compatibility; safety, security, and reliability; and AF legacy nuclear stockpile certification management.

The FY2022 funding request was reduced by \$1.604 million to account for the availability of prior year execution balances.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver weapon system capability. The use of such programs funds would be in addition to the civilian pay expenses budgeted in program element 0605831F. In FY20 \$0M was expended for civilian pay expenses in this program element, and in FY21 \$0M is forecasted for civilian pay expenses in this program element

This program is in Budget Activity 5, System Development and Demonstration (SDD) because it has passed Milestone B approval and is conducting engineering and manufacturing development tasks aimed at meeting validated requirements prior to full rate production.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 0604222F / <i>Nuclear Weapons Support</i>
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B. Program Change Summary (\$ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Previous President's Budget	4.406	35.033	32.108	0.000	32.108
Current President's Budget	4.249	26.057	30.050	0.000	30.050
Total Adjustments	-0.157	-8.976	-2.058	0.000	-2.058
• Congressional General Reductions	0.000	-0.048			
• Congressional Directed Reductions	0.000	-8.928			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	-0.157	0.000			
• Other Adjustments	0.000	0.000	-2.058	0.000	-2.058

Change Summary Explanation

FY21 adjusted for Nuclear weapon system technology and integration forward financing -4,670; Nuclear weapons support forward financing -2,273; Nuclear weapons support prior year carryover -1,985; Undistributed Reduction - Excess to Need -48

FY22 reduced from previous PB due to higher Air Force priorities.

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 5					R-1 Program Element (Number/Name) PE 0604222F / Nuclear Weapons Support				Project (Number/Name) 654236 / Engineering Analysis			
COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
654236: <i>Engineering Analysis</i>	-	2.335	4.458	4.531	0.000	4.531	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Air Force Nuclear Weapons Center is the executing agency for this program. The Air Force is tasked with maintaining and providing technical expertise on all AF nuclear weapons and weapon systems and conducting mission-level cyber risk analysis, integrating cybersecurity into systems engineering, enhancing adaptability and agility via modular design and approaches, developing a cyber-savvy workforce, increasing assurance in fielded systems in a cost effective and efficient manner, increasing the integration of cyber intelligence and enabling cyber operation flights and cyber protection teams. This program provides resources for technical and programmatic activities which includes performing independent analyses on all AF nuclear weapons systems activities including weapons development and sustainment; interoperability; compatibility; training; safety, security, and reliability; Air Force legacy nuclear stockpile management/retirement; nuclear certification and nuclear certification management. The AFNWC will partner with external agencies to achieve cross cutting solutions to mitigate cyber vulnerabilities. The development of Model Based System Engineering will facilitate the testing and analysis of nuclear weapons systems.

B. Accomplishments/Planned Programs (\$ in Millions)

	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Title: Engineering Analysis	2.335	4.458	4.531	-	4.531
Description: Provide the technical oversight of all Air Force (AF) nuclear weapons, delivery systems, and support systems. Provide the engineering and technical management expertise required in critical areas of nuclear weapons safety, security, reliability, operations, modernization, testing, certification, and counter proliferation.					
FY 2021 Plans: Increase analysis and documentation of nuclear weapons issues related to risk assessment, data collection, model development, model validation and verification, weapon effectiveness, and nuclear stockpile planning and requirements assessment.					
FY 2022 Base Plans: Continue to increase analysis and documentation of nuclear weapons issues related to risk assessment, data collection, model development, model validation and verification, weapon effectiveness, and nuclear stockpile planning and requirements assessment.					
FY 2021 to FY 2022 Increase/Decrease Statement:					

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force	Date: May 2021
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Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 0604222F / <i>Nuclear Weapons Support</i>	Project (Number/Name) 654236 / <i>Engineering Analysis</i>
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B. Accomplishments/Planned Programs (\$ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Funding increases due to overall capabilities increase in Model Based Systems Engineering, risk assessment, data collection, model development, verification, and validation, weapon effectiveness, and nuclear stockpile planning and requirements assessment.					
Accomplishments/Planned Programs Subtotals	2.335	4.458	4.531	-	4.531

C. Other Program Funding Summary (\$ in Millions)

N/A

Remarks

D. Acquisition Strategy

Cost Plus Award Fee (CPAF) and Military Interdepartmental Purchase Request (MIPR) will be used to obtain technical analyses and technical support for safety, operations, and counter proliferation assessments. Supporting activities are contracted separately using contract strategies deemed most appropriate to the effort. All contracts will be openly competed.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 0604222F / Nuclear Weapons Support	Project (Number/Name) 654236 / Engineering Analysis
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Product Development (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Federally Funded Research and Development Center (FFRDC) Cybersecurity Vulnerability Analysis	MIPR	AEROSPACE : Kirtland AFB, NM	-	0.292	Nov 2019	0.600	Nov 2020	0.610	Nov 2021	-		0.610	-	-	-
FFRDC Emulation of the Strategic Missile Integration Complex (SMIC)	MIPR	AEROSPACE : Kirtland AFB, NM	-	0.545	Feb 2020	1.200	Feb 2021	1.250	Feb 2022	-		1.250	-	-	-
Subtotal			-	0.837		1.800		1.860		-		1.860	-	-	N/A

Support (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Secure Cyber Facility Support	MIPR	Various : Kirtland AFB, NM	-	0.227	Nov 2019	0.500	Nov 2020	0.513	Nov 2021	-		0.513	-	-	-
Mission Support	MIPR	AEROSPACE : Kirtland AFB, NM	-	0.612	Feb 2020	0.900	Feb 2021	0.900	Feb 2022	-		0.900	-	-	-
Model Based Systems Engineering (MBSE)	Reqn	Various : Kirtland AFB, NM	-	0.128	Feb 2020	0.458	Feb 2021	0.458	Feb 2022	-		0.458	-	-	-
Subtotal			-	0.967		1.858		1.871		-		1.871	-	-	N/A

Management Services (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
EZ A&AS	Various	Various : Kirtland AFB, NM	-	0.431	Feb 2020	0.600	Feb 2021	0.600	Feb 2022	-		0.600	-	-	-
Program Management Support (PMA)	Various	Various : Kirtland AFB, NM	-	0.100	Mar 2020	0.200	Mar 2021	0.200	Mar 2022	-		0.200	-	-	-
Subtotal			-	0.531		0.800		0.800		-		0.800	-	-	N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 0604222F / <i>Nuclear Weapons Support</i>	Project (Number/Name) 654236 / <i>Engineering Analysis</i>
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	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	-	2.335	4.458	4.531	-	4.531	-	-	N/A

Remarks

FFRDC Cybersecurity Vulnerability Analysis: FY22 reflects current allocated FY22 Staff Years of Technical Effort (STE) allocations across AFNWC.

FFRDC Emulation of the Strategic Missile Integration Complex (SMIC): Increases reflect actuals to continue an accelerated program.

Secure Cyber Facility Support increase reflects actuals supporting the stand-up of engineering analysis capabilities within AFNWC/EZ.

Mission Support increases reflect additional STE support.

Model Based Systems Engineering (MBSE) requirements reflect increased capability.

EZ A&AS requirements reflect actuals. The FY22 increase supports increased program requirements supporting establishment of program capabilities across AFNWC/EZ, cybersecurity, and engineering analysis.

Program Management Support (PMA) reflects actual FY22 increases as program capabilities increase overall.

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Exhibit R-4, RDT&E Schedule Profile: PB 2022 Air Force **Date: May 2021**

Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 0604222F / <i>Nuclear Weapons Support</i>	Project (Number/Name) 654236 / <i>Engineering Analysis</i>
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	FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

Engineering & Cyber Security Analysis	
Cyber Security Vulnerability Assessments & Analysis	
Emulation of the SMIC	
Secure Cyber Facility Support	
MBSE	

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Exhibit R-4A, RDT&E Schedule Details: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 0604222F / <i>Nuclear Weapons Support</i>	Project (Number/Name) 654236 / <i>Engineering Analysis</i>
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Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>Engineering & Cyber Security Analysis</i>				
Cyber Security Vulnerability Assessments & Analysis	1	2020	4	2026
Emulation of the SMIC	1	2020	4	2026
Secure Cyber Facility Support	1	2020	4	2026
MBSE	2	2020	4	2026

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force										Date: May 2021		
Appropriation/Budget Activity 3600 / 5					R-1 Program Element (Number/Name) PE 0604222F / Nuclear Weapons Support				Project (Number/Name) 654807 / Nuclear Weapon System Technology and Integration			
COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
654807: Nuclear Weapon System Technology and Integration	-	0.000	14.639	19.474	0.000	19.474	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The AFNWC is the executing agency for the Nuclear Weapon System Technology and Integration (NWST&I) program that ensures the safety, survivability, security, and reliability of AF nuclear weapon systems in direct support to the National Command Structure and military warfighter with emphasis placed on assurance of survivability and mitigation of vulnerabilities to these unique systems. These requirements are met through studies and analyses, demonstration, modeling and simulation (M&S), test and evaluation (T&E), trade studies, requirements analysis, and recommendations to planning, policy, and doctrine.

B. Accomplishments/Planned Programs (\$ in Millions)

	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Title: Weapons Effects	0.000	3.706	6.174	0.000	6.174
<p>Description: Ensures survivable and effective AF systems through evaluation, test, and analyses of nuclear environments and their impact to AF platforms. Develops and maintains the sole AF analytical capability to assess nuclear effects, systems inherent hardness and mission degradation within a nuclear environment. These efforts shape and support requirements for new acquisitions, fielded systems, as well as providing critical expertise for exercises and operational planning.</p> <p>FY 2021 Plans: Development, modernization, verification and validation of M&S tools. Develop rigorous methods and tools for testing and predictive response to nuclear effects. Perform analysis to establish hardness requirements within the weapon system specification for current and future delivery aircraft, support aircraft, weapon systems, Intercontinental Ballistic Missiles (ICBM), and associated Nuclear Command, Control, and Communication (NC3) assets. Develop methods and tools used to assure weapon effectiveness in operationally relevant environments.</p> <p>FY 2022 Base Plans: Increased development, modernization, verification and validation of M&S tools. Develop rigorous methods and tools for testing and predictive response to nuclear effects. Increase analysis to establish hardness requirements within the weapon system specification for current and future delivery aircraft, support aircraft,</p>					

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 0604222F / <i>Nuclear Weapons Support</i>	Project (Number/Name) 654807 / <i>Nuclear Weapon System Technology and Integration</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
<p>weapon systems, ICBM, and NC3 assets. Expand development of methods and tools used to assure weapon effectiveness in operationally relevant environments.</p> <p>FY 2022 OCO Plans: N/A</p> <p>FY 2021 to FY 2022 Increase/Decrease Statement: Increase is due to expanded testing requirements and activities deferred from 2021.</p>					
<p>Title: Air Force Nuclear Red Team (AFNRT)</p> <p>Description: The AFNRT independently evaluates vulnerabilities of current and future strategic systems across their lifecycle vs near term and emerging threats. These strategic systems capability assessments include nuclear weapon systems fragility analyses, Vulnerability Modes & Effects Analysis, M&S and effects testing. As part of the effort to assess the vulnerabilities, data is used from various tests and modeling and simulation tools to develop mitigation strategies for consideration by program offices. This analysis of various threats to AF nuclear weapons systems is used to inform warfighter concept of operations (CONOPS), modernization activities, and new acquisitions.</p> <p>FY 2021 Plans: Assessing strategic system capabilities/vulnerabilities relative to Air-Delivered (AD) nuclear weapon systems, ICBMs, and NC3. Threat evaluations and analyses to address current and future threats that include, but not limited to, kinetic, Electronic Warfare (EW), cyber, supply chain and maintenance/logistics vulnerabilities. Assessments are evaluated using existing weapon/platform pairing with current and emerging threat vectors, as well as proposed modernization requirements. AD, ICBM, and NC3 assessments are used in the development of requirements, CONOPS and Tactics, technics and Procedures (TTPs) for modernization activities, and new acquisitions. These assessments include nuclear weapon systems fragility analyses, Vulnerability Modes & Effects Analysis, M&S and conduct effects testing.</p> <p>FY 2022 Base Plans: Expanded assessments of strategic system capabilities/vulnerabilities relative to Air-Delivered (AD) nuclear weapon systems, ICBMs, and NC3. Further threat evaluations and analyses to address current and future threats that include, but not limited to, kinetic, EW, cyber, supply chain and maintenance/logistics vulnerabilities. Assessments are evaluated using existing weapon/platform pairing with current and emerging threat vectors, as well as proposed modernization requirements. AD, ICBM, and NC3 assessments are used in the development of requirements, CONOPS and TTPs for modernization activities, and new acquisitions. These assessments</p>	0.000	10.933	13.300	0.000	13.300

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 0604222F / <i>Nuclear Weapons Support</i>	Project (Number/Name) 654807 / <i>Nuclear Weapon System Technology and Integration</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
include nuclear weapon systems fragility analyses, Vulnerability Modes & Effects Analysis, M&S and conduct effects testing. FY 2022 OCO Plans: N/A FY 2021 to FY 2022 Increase/Decrease Statement: Increase is due to expanded assessments and activities deferred from 2021.					
Accomplishments/Planned Programs Subtotals	0.000	14.639	19.474	0.000	19.474

C. Other Program Funding Summary (\$ in Millions)

N/A

Remarks

D. Acquisition Strategy

Multiple Cost Plus Fixed Fee (CPFF) and/or Time and Material (T&M) and Military Interdepartmental Purchase Requests (MIPR) are/will be used to obtain testing and evaluations, technical analyses and/or technical support for the technology and integration processes. All contracts will be openly competed.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 0604222F / Nuclear Weapons Support	Project (Number/Name) 654807 / Nuclear Weapon System Technology and Integration
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Support (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
NWST&I - Modeling & Simulation	C/CPFF	Peerless Technology Corp : Kirtland AFB, NM, NM	-	0.000		0.750	Apr 2021	2.598	Nov 2021	0.000		2.598	-	-	-
NWST&I - FFRDC Engineering & Technical Support	MIPR	Aerospace Corp(SMC) : El Segundo, CA	-	0.000		1.416	Jan 2021	2.717	Nov 2021	0.000		2.717	-	-	-
NWST&I - Security Support	MIPR	Various : Kirtland AFB, NM	-	0.000		0.704	Apr 2021	0.768	Dec 2021	0.000		0.768	-	-	-
NWST&I - Program Support	C/CPFF	Booz Allen Hamilton : Kirtland AFB, NM	-	0.000		3.789	Mar 2021	3.989	Feb 2022	0.000		3.989	-	-	-
Subtotal			-	0.000		6.659		10.072		0.000		10.072	-	-	N/A

Remarks
FY21 New Start and reductions required adjustments to cost and schedule to properly phase execution.

Test and Evaluation (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
NWST&I - Weapons Effects Uncertainty Testing	MIPR	Sandia National Labs : Kirtland AFB, NM	-	0.000		1.000	Mar 2021	1.020	Jan 2022	0.000		1.020	-	-	-
NWST&I - AFNRT Assessments 1	MIPR	Sandia National Labs : Various	-	0.000		5.006	Mar 2021	3.766	Dec 2021	0.000		3.766	-	-	-
NWST&I - AFNRT Assessments 2	MIPR	Booz Allen Hamilton : Kirtland AFB, NM	-	0.000		1.400	Mar 2021	2.030	Feb 2022	0.000		2.030	-	-	-
NWST&I - UARC Test & Evaluation	C/CPAF	John Hopkins University : Laurel, MD	-	0.000		-		2.030	Mar 2022	0.000		2.030	-	-	-
Subtotal			-	0.000		7.406		8.846		0.000		8.846	-	-	N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 0604222F / Nuclear Weapons Support	Project (Number/Name) 654807 / Nuclear Weapon System Technology and Integration
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Test and Evaluation (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			

Remarks
FY21 New Start and reductions required adjustments to cost and schedule to properly phase execution.

Management Services (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
NWST&I Program Management Administration (PMA)	Various	Various : Kirtland AFB, NM	-	0.000		0.574	Feb 2021	0.556	Nov 2021	0.000		0.556	-	-	-
Subtotal			-	0.000		0.574		0.556		0.000		0.556	-	-	N/A

Remarks
PMA includes travel, supply and enclave system and communication support

	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	-	0.000	14.639	19.474	0.000	19.474	-	-	N/A

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 0604222F / Nuclear Weapons Support	Project (Number/Name) 654807 / Nuclear Weapon System Technology and Integration

FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

AF Nuclear Red Team	
Assessments 1	
Assessments 2	
Weapons Effects	
Weapons Uncertainty	
Modeling & Simulation	
Program Support	
Engineering	
Security	
Program Analysis	
PMA	

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Exhibit R-4A, RDT&E Schedule Details: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 0604222F / <i>Nuclear Weapons Support</i>	Project (Number/Name) 654807 / <i>Nuclear Weapon System Technology and Integration</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>AF Nuclear Red Team</i>				
Assessments 1	2	2021	4	2026
Assessments 2	2	2021	4	2026
<i>Weapons Effects</i>				
Weapons Uncertainty	2	2021	4	2026
Modeling & Simulation	3	2021	4	2026
<i>Program Support</i>				
Engineering	2	2021	4	2026
Security	3	2021	4	2026
Program Analysis	2	2021	4	2026
PMA	2	2021	4	2026

Note

FY21 New Start and reductions required adjustments to cost and schedule to properly phase execution.
All sub-projects are continuous support/testing to all nuclear weapon systems.

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 0604222F / Nuclear Weapons Support	Project (Number/Name) 655708 / Nuclear Weapons Support
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COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
655708: Nuclear Weapons Support	-	1.914	6.960	6.045	0.000	6.045	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The modernization of legacy nuclear systems, development of new nuclear-capable aircraft and munitions and the creation of the new Weapon Generation Facilities (WGF) within Air Force Global Strike Command (AFGSC) may require new support equipment capabilities to meet system and mission requirements. Additionally, the WGF introduces a new concept of operations by integrating maintenance and storage mission sets into one facility. To support mission generation requirements, support equipment and capabilities related to the nuclear enterprise must be studied, reviewed, modified, or in extreme cases, re-developed in order to maintain operational readiness. Examples of equipment under review include, but are not limited to, power generation, heating, ventilation, and air conditioning (HVAC), munition trailers/accessories, munition lifts/accessories, tow vehicles, and munition test/maintenance stands such as the MHU-141, MHU-174, MHU-194, MHU-196/204, MHU-83 & MB-4. Any identified capability gaps may result in the design of new system. The review, analysis and potential modification of existing equipment ensures mission generation remains executable.

B. Accomplishments/Planned Programs (\$ in Millions)

	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Title: Nuclear Enterprise Support Equipment	1.914	6.960	6.045	-	6.045
Description: Nuclear Enterprise Support Equipment Review and Design					
FY 2021 Plans: This effort continues the capabilities-based assessment and road-mapping study to determine if a "Family-of-Systems" concept for munitions lift trucks (aka. jammers) can be developed and leveraged to meet the needs of the WGF and our nuclear aircraft and munition weapon systems across the enterprise. A "Family-of-Jammers" can potentially reduce AF life-cycle sustainment and ownership costs, improve mission generation timelines and enhance user safety. This study may include a review of powered aerospace ground equipment (AGE) if time permits.					
FY21 also includes the development, design, and test of a replacement system for MHU-174 aerial stores lift truck used within the WGF that is currently unsupported and obsolete. Efforts for the previously reported eTUG was discontinued after WGF designs no longer required that capability. Budget includes funds for PMA, A&AS, travel, SIPR facility improvements and other equipment required to execute program activities, as well as develop nuclear-related requirements across the nuclear enterprise that impact operations.					
FY 2022 Base Plans:					

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 0604222F / <i>Nuclear Weapons Support</i>	Project (Number/Name) 655708 / <i>Nuclear Weapons Support</i>
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B. Accomplishments/Planned Programs (\$ in Millions)

	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
<p>This effort completes the "Family-of-Jammers" capabilities based assessment & road mapping study. Follow-on studies will leverages data from the jammer study and begins analysis of agile, environmentally friendly universal flightline power generation and/or air conditioner systems to support nuclear enterprise aircraft such as the B-52, B-21, E-8, and other large aircraft, as well as dual-capable aircraft such as the F-35, F-15 and F-16. Efforts may include the limited procurement of commercial off-the-shelf electric (battery) power systems and/or advanced prototype systems to assess military suitability, feasibility, and maintainability of electrified systems in cold, hot and other operational environments. Data will support future requirements documents and concept of operations development.</p> <p>Transitions and continues large munitions lift trailer Small Business Innovative Research (SBIR) efforts from AFGSC. Efforts will continue maturing designs for a new 20k lbs class munitions lift trailer to support current/ emerging weapon systems requirements as well as to support replacement of the current 40k lbs class munitions trailer. Additionally, research and development activities will introduce innovative solutions/systems to improve mission generation timelines, improve user safety and potentially reduce manpower requirements.</p> <p>Continues the development, design, and test of a replacement system for MHU-174 aerial stores lift truck used within the WGF that is currently unsupportable and obsolete.</p> <p>Budget include funds for PMA, A&AS, travel, and other equipment required to execute program activities as well as develop nuclear-related requirements across the nuclear enterprise that impact operations.</p> <p><i>FY 2021 to FY 2022 Increase/Decrease Statement:</i> Funds decrease reflect program schedule and funding requirements.</p>					
Accomplishments/Planned Programs Subtotals	1.914	6.960	6.045	-	6.045

C. Other Program Funding Summary (\$ in Millions)

N/A

Remarks

D. Acquisition Strategy

The acquisition strategy for a replacement to the MHU-174, 7k lbs capacity aerial stores lift truck (Jammer) is open competition, pending industry interest, and likely a small business award.

The 20k lbs jammer design and innovation activity in anticipated to continue with a small business innovative research (SBIR) follow-on contract.

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity	R-1 Program Element (Number/Name)	Project (Number/Name)
3600 / 5	PE 0604222F / <i>Nuclear Weapons Support</i>	655708 / <i>Nuclear Weapons Support</i>

Additional studies, to included limited field/operational suitability studies, will leverage existing studies contracts and will be competitively awarded as appropriate.

Future acquisition strategies for any other developmental efforts identified by on-going capability studies will be identified in appropriate future budget updates, as required.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 0604222F / Nuclear Weapons Support	Project (Number/Name) 655708 / Nuclear Weapons Support
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Product Development (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Contract Award - Aerial Stores Lift Truck (Sm/Med class)	C/CPFF	Not specified. : TBD	-	0.489	Sep 2021	5.248	Sep 2021	-		-		-	-	-	-
Contract Award - Aerial Stores Lift Truck (Large Class)	TBD	Not specified. : TBD	-	-		-		1.500	Apr 2022	-		1.500	-	-	-
Contract Award - Electric Flightline Power Systems	TBD	Not specified. : TBD	-	-		-		3.200	Dec 2021	-		3.200	-	-	-
Nuclear Support Equipment Analysis	PO	Not specified. : TBD	-	0.438	Oct 2020	0.300	Jul 2021	-		-		-	-	-	-
Subtotal			-	0.927		5.548		4.700		-		4.700	-	-	N/A

Support (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Contractor Support	PO	Not specified. : TBD	-	0.850	May 2020	1.382	Dec 2022	1.325	Mar 2022	-		1.325	-	-	-
Government Management Services	Various	Not specified. : TBD	-	0.137	Jan 2020	0.030	May 2021	0.020	Nov 2022	-		0.020	-	-	-
Subtotal			-	0.987		1.412		1.345		-		1.345	-	-	N/A

	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals		-	1.914	6.960	6.045	6.045	-	-	N/A

Remarks
 FY21 PB "Facility Support Equipment Analysis" is now called "Nuclear Support Equipment Analysis" to best reflect the effort to study munition trailer and loader "family-of-systems" requirements across the nuclear enterprise, to include WGF, emerging strategic systems and legacy modifications.

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Exhibit R-4A, RDT&E Schedule Details: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 0604222F / <i>Nuclear Weapons Support</i>	Project (Number/Name) 655708 / <i>Nuclear Weapons Support</i>
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Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>Nuclear Enterprise Support Equipment</i>				
Sm/Med Munition Loader Development/Production/Test	4	2021	3	2024
Aerial Stores Lift Truck Study	1	2021	1	2022
Powered Aerospace Ground Equipment Study	4	2021	3	2022
20-40K lbs Class Munition Loader Development/Test	2	2022	4	2023
Electrified Flight-line Power Systems Testing	2	2022	3	2023

Note

In FY21, program efforts no longer include development of the eTUG since that capability was removed from the nuclear weapons generation facility (WGF) requirement.

The small/med munitions lift truck is a nuclear certified system required within the WGF facility to support missile operations.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 5: System Development & Demonstration (SDD)</i>					R-1 Program Element (Number/Name) PE 0604270F / <i>Electronic Warfare Development</i>							
COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
Total Program Element	-	1.994	2.094	2.110	0.000	2.110	-	-	-	-	-	-
653891: <i>Adv Infrared Counter Measures(Aircm)</i>	-	1.994	2.094	2.110	0.000	2.110	-	-	-	-	-	-

A. Mission Description and Budget Item Justification

The Advanced Infrared Countermeasure (AIRCMM) project contains related aircraft self-protection efforts aimed at increasing aircraft survivability against the increasing threat of sophisticated surface-to-air and air-to-air missiles. These missiles may employ sophisticated next-generation Electro-Optics (EO), Infrared (IR), Radio Frequency (RF), dual-mode (i.e. IR and RF), or multi-mode seekers. AIRCMM will provide advanced expendable countermeasures and/or techniques that will be functionally compatible with existing dispenser systems and employed across multiple USAF weapons systems. This also includes any and all flare, chaff, decoy, and associated component development and testing that may be demanded or needed in current operations supporting the war on terrorism regardless of aircraft platform. Similar activities that are supplementary to this effort may be accomplished ad hoc using platform specific funding or through other activities such as joint services or NATO test groups.

This program element may include necessary emergent or unanticipated civilian pay expenses required to manage, execute, and deliver Advanced Infrared Countermeasures for emergent or unanticipated weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program element 06053891F. In FY 2022, \$0.00 is planned to be used in total compensation and benefits for 0 civilian full time equivalents with an \$0.00 average work year salary.

This program is in Budget Activity 5, System Development and Demonstration (SDD) because it has passed Milestone B approval and is conducting engineering and manufacturing development tasks aimed at meeting validated requirements prior to full rate production.

B. Program Change Summary (\$ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Previous President's Budget	2.066	2.098	2.142	0.000	2.142
Current President's Budget	1.994	2.094	2.110	0.000	2.110
Total Adjustments	-0.072	-0.004	-0.032	0.000	-0.032
• Congressional General Reductions	0.000	-0.004			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	-0.072	0.000			
• Other Adjustments	0.000	0.000	-0.032	0.000	-0.032

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force Date: May 2021

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 0604270F / <i>Electronic Warfare Development</i>
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Change Summary Explanation

No Significant Changes

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force										Date: May 2021		
Appropriation/Budget Activity 3600 / 5					R-1 Program Element (Number/Name) PE 0604270F / <i>Electronic Warfare Development</i>				Project (Number/Name) 653891 / <i>Adv Infrared Counter Measures(Aircm)</i>			
COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
653891: <i>Adv Infrared Counter Measures(Aircm)</i>	-	1.994	2.094	2.110	0.000	2.110	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Advanced Infrared Countermeasure (AIRCМ) project contains related aircraft self-protection efforts aimed at increasing aircraft survivability against the increasing threat of sophisticated surface-to-air and air-to-air missiles. These missiles may employ sophisticated next-generation Electro-Optics (EO), Infrared (IR), Radio Frequency (RF), dual-mode (i.e. IR and RF), or multi-mode seekers. AIRCM will provide advanced expendable countermeasures and/or techniques that will be functionally compatible with existing dispenser systems and employed across multiple USAF weapons systems. This also includes any and all flare, chaff, decoy, and associated component development and testing that may be demanded or needed in current operations supporting the war on terrorism regardless of aircraft platform. Similar activities that are supplementary to this effort may be accomplished ad hoc using platform specific funding or through other activities such as joint services or NATO test groups.

This program element may include necessary emergent or unanticipated civilian pay expenses required to manage, execute, and deliver Advanced Infrared Countermeasures for emergent or unanticipated weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program element 0605831F.

This program element may include necessary test or evaluation equipment required to assess Advanced Infrared Countermeasure weapons system capabilities.

B. Accomplishments/Planned Programs (\$ in Millions)

	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Title: Countermeasure Development and Testing	1.994	2.094	2.110	-	2.110
Description: Development, testing and qualification of EO, IR, and RF countermeasures on aircraft					
FY 2021 Plans: Activities include development, testing and qualification of expendable countermeasures or cocktails on various aircraft.					
FY 2022 Base Plans: Activities include development, testing and qualification of expendable countermeasures or cocktails on various aircraft.					
FY 2021 to FY 2022 Increase/Decrease Statement:					

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 0604270F / <i>Electronic Warfare Development</i>	Project (Number/Name) 653891 / <i>Adv Infrared Counter Measures(Aircm)</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Funding increased due to inflation.					
Accomplishments/Planned Programs Subtotals	1.994	2.094	2.110	-	2.110

C. Other Program Funding Summary (\$ in Millions)											
Line Item	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
• PAAF 01 352010: <i>Cartridges</i>	26.660	20.618	26.483	0.000	26.483	-	-	-	-	-	-
• PAAF 01 356010: <i>Flares</i>	139.388	61.259	88.815	6.482	95.297	-	-	-	-	-	-

Remarks
Qualified flares, if not in AF inventory, will be procured under program 0208030F War Reserve Munitions, Flares.

D. Acquisition Strategy
Contracts are awarded through the Department of Defense Ordnance Technology Consortium (DOTC), or Other Transaction Authorities (OTAs), such as Cornerstone Industrial Base Analysis & Sustainment (IBAS), which facilitates collaborative Government, Industry, and Academic ordnance technology development and prototyping initiatives. They serve as a single point contracting agent for development/technology demonstrations needed to advance and expand our military technological superiority.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 0604270F / <i>Electronic Warfare Development</i>	Project (Number/Name) 653891 / <i>Adv Infrared Counter Measures(Aircm)</i>
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Product Development (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
IR/UV: Black Body Thrusted Flare	C/CPFF	Cornerstone OTA : TBD	-	0.051	Jun 2020	-		1.110	Jun 2022	-		1.110	-	-	-
Subtotal			-	0.051		-		1.110		-		1.110	-	-	N/A

Remarks
Development of Advanced Expendable Countermeasures to defeat currently fielded threats from which aircraft are not sufficiently protected.

Test and Evaluation (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Modeling and Simulation	MIPR	Air Force Research Laboratory : WPAFB, OH	-	1.000	Jun 2020	1.000	Jun 2021	1.000	Jun 2022	-		1.000	-	-	-
Range Test	MIPR	96th Test Wing : Eglin AFB, FL	-	0.140	Oct 2020	-		-		-		-	-	-	-
Test Support	MIPR	Various : NV	-	0.803	Jun 2020	1.094	Jun 2021	-		-		-	-	-	-
Subtotal			-	1.943		2.094		1.000		-		1.000	-	-	N/A

Remarks

Modeling and simulation

- This entails performance of modeling and simulation (to include threat hardware in-the-loop) which helps to predict advanced expendable countermeasure effectiveness and develop and define Air Force requirements
- Performing activity varies; conducted by AFRL and Georgia Tech Research Center

Range Test

- This is the cost to use the range for testing (Radiometric, Captive Seeker, Flight, etc.)
- Performing Activity & Location varies; 96th Test Wing, Eglin AFB, FL, White Sands Missile Range, NM, Gila Bend, AZ

Test Support

- This includes but is not limited to Seeker Test Vans (multiple vans required for Captive Seeker), duo chrome camera, and other test equipment
- Activities/support during testing (i.e. communications/electric/security)
- Performing Activity & Location should remain "Various: TBD", multiple activities are included

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Exhibit R-4A, RDT&E Schedule Details: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 0604270F / <i>Electronic Warfare Development</i>	Project (Number/Name) 653891 / <i>Adv Infrared Counter Measures(Aircm)</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>Advance IR Aircm</i>				
Modeling and Simulation - Threat Exploitation	1	2020	4	2026
Pulse Kinematic Flare Development	1	2020	4	2021
IR/UV: Black Body Thrusted Flare Development	1	2022	4	2024
Advanced IR Flare Development for future threats	1	2024	4	2026

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 0604281F / <i>Tactical Data Networks Enterprise</i>
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COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
Total Program Element	-	182.691	121.188	169.836	0.000	169.836	-	-	-	-	-	-
655050: <i>TDL System Integration</i>	-	182.691	109.647	119.252	0.000	119.252	-	-	-	-	-	-
655262: <i>Family of Gateways</i>	-	0.000	11.541	50.584	0.000	50.584	-	-	-	-	-	-

A. Mission Description and Budget Item Justification

The Tactical Data Networks Enterprise (TDNE) develops, enhances and fields Tactical Data Links (TDL) including internet protocol (IP) networks, advanced waveforms, radios, network management tools, and associated hardware and software that comprise the Joint Aerial Layer Network (JALN). This will be accomplished by upgrading currently fielded communications and TDL systems and IP networks. The upgrades will be effected by the development and fielding of more advanced systems in support of the Advanced Battle Management System (ABMS). ABMS is a family of systems which provides capabilities consisting of air, land, and maritime surveillance, tactical communications and networking, integrated with battle management command and control in support of Joint forces. ABMS is an integral component to transition to the Joint All Domain Command and Control (JADC2) concept at the tactical level of warfare. TDNE supports the development, fielding and training of aerial layer networking capabilities across multiple force projection missions including air superiority, ground precision attack, command and control, intelligence, surveillance and reconnaissance (ISR), and personal recovery while integrating capabilities with space operations. TDNE also addresses warfighter urgent demands through the establishment of Quick Reaction Capabilities (QRC) and enterprise activities. TDNE executes quick reaction response capability requests by the warfighter and support activities (including ramp-up) associated with the JALN enterprise. This program ensures the continued enhanced interoperability of Air Force and joint/coalition/NATO assets through efforts such as early systems engineering for program requirements analysis and architectural design development/coordination of all TDN standards and management capabilities, configuration management, platform/system interoperability assessments, development of government reference architectures, interoperability certification testing, and flight testing. The aerial layer extends to interfacing with space communication assets (both military and commercial). An example of this interface work includes the use of the Protected Tactical Waveform (PTW) designed to mitigate the effects of advanced jamming in Anti-Access/Area Denial environments. PTW provides worldwide, beyond line of sight, Anti-Jam (AJ), Low Probability of Intercept communications, via military and commercial satellite systems for tactical users in all services. It includes terminal certification efforts (Information Assurance (IA), NSA and MIL-STD). PTW development activities may include technical and acquisition-related studies, analysis, early systems engineering and risk reduction activities, addressing all subsystems to support both current program planning/execution and future AF program planning. This effort also funds PTW modem development and aperture development on suitable platforms. Satellite communication efforts includes all necessary system components to leverage commercially available space assets such as antennas modems, and network management support systems.

TDL System Integration will provide for the study (acquisitions current and proposed), analysis, enhancement, development, integration, demonstration, test, and evaluation of TDLs as a subset of the broader aerial layer networks. TDLs are used in both peace time and combat environments to exchange information such as character-oriented and fixed-formatted messages, data, radar tracks, target information, platform status, imagery, free-text messaging and command assignments. TDLs provide interoperability, local and global connectivity, and situational awareness to the user when training or fighting under rapidly changing operational conditions. TDLs increase mission effectiveness by providing enhanced air domain situational awareness, positive combat identification of aircraft in the network, fusion/correlation of on- and off-board sensor data, digital sharing of machine-to-machine target and threat information, thereby, enabling time critical targeting and other mission assignment

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force	Date: May 2021
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Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 0604281F / <i>Tactical Data Networks Enterprise</i>
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tasking. TDLs are used by all service theater command and control (C2) elements, weapons platforms, and sensors. TDLs include, but are not limited to: Link 16, Link 11, Link 22, Situational Awareness Data Link (SADL), Variable Message Format (VMF), , and other Advanced TDL Link technologies, such as Tactical Targeting Network Technology (TTNT), Common Data Link (CDL), Intra-Flight Data Link (IFDL) and Multifunction Advanced Data Link (MADL) . SATURN (Second-Generation Anti-Jam Tactical UHF Radio for NATO) is the next generation UHF line-of-sight link and is required to support a resilient voice and data capability for operations in a contested environment. A DoD CIO mandate requires transition from the HQII waveform to the SATURN waveform as the standard for UHF line of sight air-to-air and air-to-ground communications interoperability no later than Dec 31, 2023. Agile Communications includes the capability to share tactically significant information within/ to/from highly contested environments in support of the Air Superiority 2030 Flight Plan. Agile Communication efforts provide processes and coordination for enterprise communication development activities. High Capacity Backbone (HCB), a subset of the overall ABMS plan, will provide the warfighter with a robust communication infrastructure enhancing C2 capabilities. HCB connects users operating within disadvantaged conditions to space and terrestrial communications utilizing Deployed Ground Entry Points (DGEP) and aerial nodes. Tactical Data Link Planning, Analysis and Planning (TDL PAM) provides a tool to monitor, troubleshoot and repair any issues with Link 16 network. Link 16 Enhancements will develop and field an advanced signal processing capability on Airborne platforms to address threats in the contested and highly contested environments. To address future Advanced Tactical Datalinks, development of a Software Programmable OMS compliant (SPOC) radio terminal prototype is being built and tested. SPOC will provide a next generation radio set capable of hosting a variety of advanced tactical datalinks which aligns with the ABMS plan, and allows for more than one waveform operating simultaneously resulting in improved connectivity and situational awareness for the warfighter.

Communication gateways are necessary to support systems of systems integration and the delivery of information exchanges across disparate physical and logical network pathways. Gateway functions include enabling interoperability between data formats, protocols, and communication mediums. Additionally, gateway functions extend the connectivity range, consolidate data from multiple networks into high capacity links for transmission to key C2ISR nodes, route information between disadvantaged users, and fuse/correlate data from multiple sources to improve accuracy. Gateway functions also provide application hosting, shared data storage, on-demand information access, smart data forwarding, and system monitoring and network management. Family of Gateways provides for the study (acquisitions current and proposed), analysis, enhancements, development, integration, costing, demonstration, test, and evaluation efforts related to future TDL communications development that will allow joint combat forces to exchange information quickly and accurately by bridging discrete airborne, terrestrial, maritime, and space-based C4ISR networks producing operational effects not possible within individual networks. Additionally, Family of Gateways will support enhancements of existing TDL performance, through upgrades and engineering analysis of system designs. Efforts in this project include waveform, ground, and rapid acquisition activities supporting Air Force requirements for communication bridging across multiple platforms, sources and communication domains.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver Tactical Data Network system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program element 0605831F. In FY20 \$0.347M expended and in FY21 \$0.494M is estimated for civilian pay expenses in this program element.

This program is in Budget Activity 5, System Development and Demonstration (SDD) because it has passed Milestone B approval and is conducting engineering and manufacturing development tasks aimed at meeting validated requirements prior to full rate production.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force	Date: May 2021
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Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 0604281F / <i>Tactical Data Networks Enterprise</i>
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B. Program Change Summary (\$ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Previous President's Budget	189.631	131.909	171.716	0.000	171.716
Current President's Budget	182.691	121.188	169.836	0.000	169.836
Total Adjustments	-6.940	-10.721	-1.880	0.000	-1.880
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	-10.721			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	-6.940	0.000			
• Other Adjustments	0.000	0.000	-1.880	0.000	-1.880

Change Summary Explanation

FY 20: Decrease 6.940M FY 20 Small Business Innovation Research (SIBR)

FY 21: Decrease of 10.721M based on Congressional Mark.

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 0604281F / <i>Tactical Data Networks Enterprise</i>	Project (Number/Name) 655050 / <i>TDL System Integration</i>
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COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
655050: <i>TDL System Integration</i>	-	182.691	109.647	119.252	0.000	119.252	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-	-	-

A. Mission Description and Budget Item Justification

Tactical Data Links (TDL) System Integration provides for the study, analysis, enhancement, development, integration, demonstration, joint/coalition/NATO interoperability exercises, costing, test, trials, and evaluation of TDL as a subset of the broader aerial layer network. TDLs are used in both peacetime and combat environments to exchange information such as character-oriented and fixed-formatted messages, data, radar tracks, target information, platform status, imagery, free-text messaging and command assignments. TDLs provide interoperability, local and global connectivity, and situational awareness to the user when training or fighting under rapidly changing operational conditions. TDLs increase mission effectiveness by providing enhanced air domain situational awareness, positive combat identification of aircraft in the network, fusion/correlation of on- and off-board sensor data, digital sharing of machine to machine target and threat information and, thereby, enabling time critical targeting and other mission assignment tasking. TDLs are used by all service, NATO, and coalition theater C2 elements, weapons platforms, and sensors.

The number of Air Force platforms hosting TDLs has expanded from C2 aircraft (E-3, E-8, E-11A, EQ-4B, etc.) to the fighter, bomber, intelligence, surveillance and reconnaissance (ISR), tanker, airlift and other tactical fleets (F-15, F-16, F-22A, Rivet Joint, B-1, B-2, B-52, KC-46, etc.), as well as precision guided munitions. Utilization of TDLs in joint and international environments requires the integration of terminals into host platforms and interoperability of TDL networks across all deployed joint/Coalition/NATO platforms. Recent mandates require additional studies and analysis in order to meet frequency reprogramming and cryptographic requirements.

High Capacity Backbone (HCB) effort implements an incremental approach for deploying resilient reach back connectivity to DISN services and in-theater rear echelon organizations through dedicated aerial gateways and opportunistic airborne nodes. The HCB Transport supports a robust deployable ground infrastructure required, through reach back, range extension and payload control. It will use an open system approach composed of non-proprietary government and commercial interface standards. Link 16 Enhancement will develop and field advanced signal processing capabilities on 4th and 5th generation platforms to address threats in the contested and highly contested environments.

Efforts in this project include waveform and integration activities.

Waveform:
Waveform activities include, but are not limited to, enabling and supporting Joint Interoperability of Tactical Command and Control Systems (JINTACCS), joint/Coalition/NATO Interoperability, Link 16 enhancements, and development of a next generation waveform and/or advanced tactical data link. Funding will provide training, logistics development, testing and certification of individual TDL implementations to joint/allied standards, establishment of service-wide network management procedures/operations, and system-wide enhancements/testing, demonstration and experimentation.

Integration:

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 0604281F / <i>Tactical Data Networks Enterprise</i>	Project (Number/Name) 655050 / <i>TDL System Integration</i>
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Integration activities include but are not limited to, Data Link Test Facility (DTF), MIDS JTRS, Air Force Participating Test Unit (AFPTU), Interoperable System Management and Requirements Transformation (iSMART), Network Centric Capability Assessment (NCCA), NATO interoperability, Coalition interoperability, TDL Planning, Analysis, and Monitoring (TDL PAM), integration analysis of C2 of JALN, Combat Cloud, Protected Tactical Waveform (PTW) and analysis of integration on platforms of existing TDN systems, system-of-systems analysis. Funding will ensure continued enhanced interoperability of Air Force/joint/Coalition/NATO assets through efforts such as early systems engineering for program requirements analysis and architectural design development/coordination of all TDN standards and management capabilities, configuration management, platform/system interoperability assessments, development of government reference architectures, integration of cyber technologies, interoperability certification testing, and flight testing, demonstration and experimentation.

Activities also include studies, prototypes and analysis (engineering and cost) to support both current program planning and execution and future program planning efforts for Tactical Data Networks (TDN), including development of joint concepts for C2, Analysis of Alternatives (AoA) follow-on analysis, gateway planning, and Advanced Battle Management systems (ABMS).

Activities will also include joint/Coalition/NATO Interoperability that provides program office system engineering to support Foreign Military Sales (FMS). Agile Communications include the capability to share tactically significant information within/to/from highly contested environments in support of the Air Superiority 2030 Flight Plan. Agile Communication efforts provide for pre-Analysis of Alternatives (AoA) and development activities. Agile Communications supports the application of open standards & advanced apertures over an Enterprise-wide Aerial Network, enabling all platforms to share combat-relevant data/info to, from & within the Highly Contested Environment (HCE).

This program element may include necessary civilian pay expenses required to manage, execute, and deliver WEAPON SYSTEM capability. The use of such programs funds would be in addition to the civilian pay expenses budgeted in program element 0604281F” .

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B. Accomplishments/Planned Programs (\$ in Millions)

	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
<p>Title: Tactical Data Networks (TDN) Integration</p> <p>Description: TDN Integration activities include but are not limited to, Data Link Test Facility (DTF), Air Force Participating Test Unit (AFPTU), Network Centric Capability Assessment (NCCA), Joint/Coalition/NATO Interoperability, Analysis of Alternatives (AoA) follow-on, gateway planning as well as Joint Interoperability of Tactical Command and Control Systems (JINTACCS) ensures interoperability of TDL systems with associated joint, allied, and Coalition systems. It includes configuration management of TDL Military Standards (MIL-STDs), TDL message development, interoperability test/certification, and TDL message standard implementation using interoperable System Management and Requirements Transformation (iSMART) for Link 11A/B, Link 16, Link 22, Variable Message Format (VMF), Integrated Broadcast Service (IBS), Intra-flight Data Link (IFDL), Multifunction Advanced Data Link (MADL), and others. Full Motion Video (FMV) Extended Unified Relay (FEURY) system development.</p>	64.151	26.862	42.781	0.000	42.781

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 0604281F / <i>Tactical Data Networks Enterprise</i>	Project (Number/Name) 655050 / <i>TDL System Integration</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
<p>military operations. HCB reduces joint forces reliance on limited, relatively fixed/static satellite and surface line-of-sight communication components.</p> <p>HCB rapid prototyping is a demonstration of HCB network transport installed in existing USAF aircraft and deployable ground entry points that meets this Rapid Prototyping Requirements Document's threshold technical and functional requirements while operating as an integral part of an aerial layer network in a realistic operational environment</p> <p>HCB capabilities are required to close four specific capability gaps: network connectivity, network capacity, share information and data, and network management.</p> <p>FY 2021 Plans:</p> <ul style="list-style-type: none"> -Developing airborne and ground prototypes -Conducting test of the prototypes <p>FY 2022 Base Plans:</p> <ul style="list-style-type: none"> -Will continue the development of the airborne and ground prototypes -Will conduct test of the prototypes -Will develop a follow-on contract for fielding of the HCB that will be fielded on various airborne platforms <p>FY 2021 to FY 2022 Increase/Decrease Statement:</p> <p>High upfront initial equipment purchases drove higher numbers in FY20 to get prototyping efforts started. Ramp up in FY22 is to refine prototypes into production ready hardware & software and increased testing (both ground/ flight) as efforts shift into production and fielding.</p>					
<p>Title: Protected Tactical Waveform (PTW)</p> <p>Description: Protected Tactical Waveform (PTW) is a waveform designed to mitigate the effects of advanced jamming in Anti- Access/Area Denial environments. PTW provides worldwide, beyond line of sight, Anti-Jam (AJ), Low Probability of Intercept communications, via military and commercial satellite systems for tactical users in all Services. This effort funds PTW modem development and aperture development on suitable platforms to include but not limited to; F-35, RQ-4 Global Hawk and EQ-4B/E-11A Battlefield Airborne Communications Node (BACN). PTW provides communications path diversity by increasing SATCOM resilience through satellite, spectral, and waveform diversity. This effort continues work started in Protected Tactical Service Field Demonstration (PTSFD) to complete PTW maturity and modem development, leveraging TALON Tacet Avis aperture work to develop PTW antenna and radome. It includes terminal certification efforts (Information Assurance (IA), NSA and MIL-STD). This effort funds continued development of PTW components, protected</p>	10.000	9.982	0.000	-	0.000

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 0604281F / <i>Tactical Data Networks Enterprise</i>	Project (Number/Name) 655050 / <i>TDL System Integration</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
<p>tactical terminal modems that will be capable of being fully integrated into existing wideband terminals and will ensure delivery of protected tactical SATCOM to the joint and coalition warfighters in contested, degraded environments. PTW development activities may also include technical and acquisition related studies, analysis, and early systems engineering and risk reduction activities addressing all subsystems to support both current program planning/execution and future AF program planning. Funds for this major thrust are reprogrammed from BPAC 655262, Family of Gateways, for the amount of \$50.584M.</p> <p>FY 2021 Plans: -Continue to mature requirements for future PTW modem development. -Develop a standards-based PTW modem with Anti-Jam (AJ) capability to augment existing Aerial SATCOM terminals across vendors and platforms. -Continue addition of COMSEC capability to allow use of classified data and fully certify the crypto to be able to encrypt data for multiple waveforms.</p> <p>FY 2022 Base Plans: -Continue the development, integration and testing of an airborne modem that will be utilized by fighter and wide-body aircraft. -Develop a standards-based PTW modem with Anti-Jam (AJ) capability to augment existing Aerial SATCOM terminals across vendors and platforms. -Continue addition of COMSEC capability to allow use of classified data and fully certify the crypto to be able to encrypt data for multiple waveforms.</p> <p>FY 2021 to FY 2022 Increase/Decrease Statement: Ramp up in FY22 is to refine prototypes into production ready hardware & software and increased testing (both ground/flight) as efforts shift into production and fielding.</p> <p>Title: Agile Comms</p> <p>Description: Agile Comms supports the application of open standards and advanced apertures over an Enterprise-wide Aerial Network, enabling all platforms to share combat-relevant data/info to, from and within the Highly Contested Environment. It supports the application of open standards and advanced apertures over the enterprise-wide Aerial Network, enables all platforms to share combat relevant data/info to, from and within the Highly Contested Environment. Finally, funding supports planning, data collection, and analysis for initial technology maturation experimentation campaign.</p>					
	34.712	25.272	31.532	-	31.532

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force			Date: May 2021		
Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 0604281F / <i>Tactical Data Networks Enterprise</i>	Project (Number/Name) 655050 / <i>TDL System Integration</i>			
B. Accomplishments/Planned Programs (\$ in Millions)					
	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
<p><i>FY 2021 Plans:</i> - Conducting post ICD and pre AoA activities including the development of the Architecture and Enterprise Approach to the Joint Aerial Network</p> <p><i>FY 2022 Base Plans:</i> - Will continue post ICD and pre AoA activities including the development of the Architecture and Enterprise Approach to the Joint Aerial Network</p> <p><i>FY 2021 to FY 2022 Increase/Decrease Statement:</i> Requirements and funding increase are based on increased scope of analysis & prototyping for emerging ABMS efforts.</p>					
<p><i>Title:</i> Link 16 Enhancements</p> <p><i>Description:</i> Link 16 Enhancement will develop and field Link 16 Anti Jam (AJ) capabilities on 4th and 5th generation platforms to address Link 16 jamming threats in the contested and highly contested environments. This effort will implement Link 16 technologies into TDL terminals and investigate the integration of additional emerging technologies to improve communications reliability. This effort will maintain a government-controlled technical baseline(s) to efficiently execute development and enhancements. Emerging technologies will be developed and evaluated for efficacy; recommendations will be identified for appropriate terminal fielding/upgrades to platforms and will be considered when evaluating enterprise TDL capabilities/gaps.</p> <p><i>FY 2021 Plans:</i> -Conducting development and operational test on integrated solution</p> <p><i>FY 2022 Base Plans:</i> No funds</p> <p><i>FY 2021 to FY 2022 Increase/Decrease Statement:</i> Development funding drops as Link 16-specific enhancements such as enhanced throughput and concurrent multi-netting are completed and prepared for integration into payloads/platforms/terminals.</p>					
<p><i>Title:</i> SFF/DACAS Modernization and System-of-Systems (SoS) Enterprise Integration</p> <p><i>Description:</i> This effort will support the development and demonstration of Small Form Factor (SFF) technologies that can support Digitally Assisted Close Air Support (DACAS) and other missions across the full spectrum of operating environments. This effort will consider System-of-Systems (SoS) engineering, technical</p>					
	9.925	9.907	0.000	-	0.000
	12.903	9.905	9.408	-	9.408

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 0604281F / <i>Tactical Data Networks Enterprise</i>	Project (Number/Name) 655050 / <i>TDL System Integration</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
analysis/performance, platform integration, and Tactics, Techniques, and Procedures (TTPs) to best utilize technologies and acquisition approaches for enterprise modernization. SFF Phase II (TURTLE) will be a rapid prototyping and demonstration effort.					
FY 2021 Plans: -Developing and evaluating prototypes					
FY 2022 Base Plans: -Will continue the development of the phase 2 effort resulting in a new prototype -Will conduct testing of solutions with JTACS and TACP fielders					
FY 2021 to FY 2022 Increase/Decrease Statement: Increase in funds is required to build, demonstrate, and deliver Phase II prototype airborne and ground terminals: -Funds development of a new prototype, and testing of solution -Support development and demonstration of technologies to support DACAS communications between air and ground forces -Develop a system-of-systems engineering approach to include technical analysis/performance, platform integration, and TTPs to best utilize enterprise modernization.					
Accomplishments/Planned Programs Subtotals	182.691	109.647	119.252	0.000	119.252

C. Other Program Funding Summary (\$ in Millions)											
Line Item	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
• RDTE 07 PE	1.531	1.559	1.587	-	1.587	-	-	-	-	-	-
0207448F: <i>C2/ISR TDL</i>											
• APAF 05 Line Item F01500: <i>F-15</i>	53.211	40.167	20.933	-	20.933	-	-	-	-	-	-
• APAF 05 Line Item F01600: <i>F-16</i>	8.371	8.525	8.695	-	8.695	-	-	-	-	-	-
• APAF 05 Line Item B00200: <i>B-2A</i>	0.201	0.206	0.210	-	0.210	-	-	-	-	-	-
• APAF 05 Line Item B01B00: <i>B-1B</i>	0.000	0.000	0.000	-	0.000	-	-	-	-	-	-
• OPAF 03 Line Item 834010:	0.180	1.698	1.701	-	1.701	-	-	-	-	-	-
<i>General Information Technology</i>											

Remarks

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 0604281F / <i>Tactical Data Networks Enterprise</i>	Project (Number/Name) 655050 / <i>TDL System Integration</i>

D. Acquisition Strategy

The Airborne Networking Directorate provides for common development, integration, and interoperability across the entire airborne network and ensures that data links are procured and maintained as a joint, end-to-end command and control system. Platform acquisition strategies vary by program, but the majority of development and integration is normally accomplished by the weapon system prime contractor.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 0604281F / <i>Tactical Data Networks Enterprise</i>	Project (Number/Name) 655050 / <i>TDL System Integration</i>
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Product Development (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
TDN Integration	Various	Various : Various	-	48.990	Jan 2020	27.520	Jan 2021	28.325	Jan 2022	-		28.325	-	-	-
High Capacity Backbone (HCB)	C/TBD	Various : Various	-	51.000	Mar 2020	27.719	Mar 2021	35.331	Mar 2022	-		35.331	-	-	-
Agile Comms	Various	Various : Various	-	34.712	Apr 2020	25.272	Apr 2021	31.532	Jan 2022	-		31.532	-	-	-
SFF/DACAS Modernization and SoS Enterprise	Various	Various : Various	-	12.903	Jan 2020	9.905	Apr 2021	9.408	Jan 2022	-		9.408	-	-	-
Link 16 Enhancements	Various	Various : Various	-	9.925	Apr 2020	9.907	Apr 2021	-		-		-	-	-	-
Protected Tactical Waveform (PTW)	C/TBD	Not specified. : TBD	-	14.888	Mar 2020	-		-		-		-	-	-	-
Subtotal			-	172.418		100.323		104.596		-		104.596	-	-	N/A

Test and Evaluation (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
TDN Integration - DTF	PO	46th Test Squadron : Eglin AFB, FL	-	2.400	Jan 2020	0.000	Jan 2021	1.500	Dec 2021	-		1.500	-	-	-
JINTACCS	C/FFP	Spectrum Comm Inc : Newport News, VA	-	1.478	Mar 2020	3.048	Feb 2021	3.815	Mar 2022	-		3.815	-	-	-
TDN Integration - AFPTU	Various	Various : Various	-	2.350	Aug 2020	2.156	Aug 2021	2.336	Jan 2022	-		2.336	-	-	-
Subtotal			-	6.228		5.204		7.651		-		7.651	-	-	N/A

Management Services (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
TDN Integration PMA - A&AS support - NCCA,	C/CPAF	Various : Various	-	3.000	Dec 2019	3.000	Dec 2020	6.000	Apr 2022	-		6.000	-	-	-

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Exhibit R-4, RDT&E Schedule Profile: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 0604281F / <i>Tactical Data Networks Enterprise</i>	Project (Number/Name) 655050 / <i>TDL System Integration</i>

FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

<i>Tactical Data Network Enterprise</i>	
TDN Integration	
JINTACCS	
High Capacity Backbone (HCB)	
Protected Tactical Waveform (PTW)	
TDL Planning, Analysis, and Monitoring (TDL PAM)	
Agile Comms	
Link 16 Enhancement	
SFF/DACAS Modernization and SoS Enterprise Integration	

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Exhibit R-4A, RDT&E Schedule Details: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 0604281F / <i>Tactical Data Networks Enterprise</i>	Project (Number/Name) 655050 / <i>TDL System Integration</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>Tactical Data Network Enterprise</i>				
TDN Integration	1	2020	4	2022
JINTACCS	1	2020	4	2022
High Capacity Backbone (HCB)	1	2020	4	2022
Protected Tactical Waveform (PTW)	2	2020	4	2022
TDL Planning, Analysis, and Monitoring (TDL PAM)	2	2020	4	2022
Agile Comms	1	2020	4	2022
Link 16 Enhancement	1	2020	4	2022
SFF/DACAS Modernization and SoS Enterprise Integration	2	2020	4	2022

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 0604281F / <i>Tactical Data Networks Enterprise</i>	Project (Number/Name) 655262 / <i>Family of Gateways</i>
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COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
655262: <i>Family of Gateways</i>	-	0.000	11.541	50.584	0.000	50.584	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-	-	-

A. Mission Description and Budget Item Justification

Family of Gateways provides for the study (acquisitions current and proposed), analysis, enhancement, development, integration, costing, demonstration, test, and evaluation efforts that will allow joint combat forces to exchange information quickly and accurately by bridging discrete airborne, terrestrial, maritime, and space-based C4ISR networks producing operational effects not possible within individual networks. Gateway functions include enabling interoperability between data formats, protocols, and communication mediums. Additionally, gateway functions extend the connectivity range, consolidate data from multiple networks into high capacity links for transmission to key C2ISR nodes, route information between disadvantaged users, and fuse/correlate data from multiple sources to improve accuracy. Gateway functions also provide application hosting, shared data storage, on-demand information access, smart data forwarding, and system monitoring and network management. Family of Gateways will support to enhance existing TDL performance, through upgrades and engineering analysis of system designs. Efforts in this project include waveform, ground, and rapid acquisition activities supporting Air Force requirements for communications bridging across multiple platforms, sources and communication domains. Funds in this BPAC, 655262, Family of Gateways will be used in BPAC 655050, TDL System Integration under the same PE 0604281, Tactical Data Networks Enterprise.

Activities also include studies, analysis, demonstrations and experiments to support both current program planning/execution and future program planning efforts for Family of Gateways or other applicable platforms.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver Tactical Data Network system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program element 0605831F.

B. Accomplishments/Planned Programs (\$ in Millions)

	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Title: Protected Tactical Waveform (PTW)	0.000	11.541	50.584	-	50.584
Description: In FY 2022, PE 0604281F, TDNE, BPAC 655262, Family of Gateways efforts were transferred to PE 0604281F, TDNE, BPAC 655050, TDL System Integration, Project Protected Tactical Waveform (PTW) in order to further aerial terminals development and integration in Wide body, UAV and Fighter configurations.					
FY 2021 Plans: -See plans in BPAC 655050, TDL System Integration.					

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 0604281F / <i>Tactical Data Networks Enterprise</i>	Project (Number/Name) 655262 / <i>Family of Gateways</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
<p>-Continue to mature requirements for future PTW modem development.</p> <p>-Develop a standards-based PTW modem with Anti-Jam (AJ) capability to augment existing Aerial SATCOM terminals across vendors and platforms.</p> <p>-Continue addition of COMSEC capability to allow use of classified data and fully certify the crypto to be able to encrypt data for multiple waveforms.</p> <p>FY 2022 Base Plans:</p> <p>- See plans in BPAC 655050, TDL System Integration.</p> <p>-Continue the development, integration and testing of an airborne modem that will be utilized by fighter and wide-body aircraft.</p> <p>-Develop a standards-based PTW modem with Anti-Jam (AJ) capability to augment existing Aerial SATCOM terminals across vendors and platforms.</p> <p>-Continue addition of COMSEC capability to allow use of classified data and fully certify the crypto to be able to encrypt data for multiple waveforms.</p> <p>FY 2021 to FY 2022 Increase/Decrease Statement:</p> <p>Ramp up in FY22 is to refine prototypes into production ready hardware & software and increased testing (both ground/flight) as efforts shift into production and fielding.</p>					
Accomplishments/Planned Programs Subtotals	0.000	11.541	50.584	-	50.584

C. Other Program Funding Summary (\$ in Millions)											
Line Item	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
• RDTE 07 PE	1.531	1.559	1.587	-	1.587	-	-	-	-	-	-
0207448F: <i>C2ISR TDL</i>											
• APAF 05 Line Item F01500: <i>F-15</i>	53.211	40.167	20.933	-	20.933	-	-	-	-	-	-
• APAF 05 Line Item F01600: <i>F-16</i>	8.371	8.525	8.695	-	8.695	-	-	-	-	-	-
• APAF 05 Line Item B00200: <i>B-2A</i>	0.201	0.206	0.210	-	0.210	-	-	-	-	-	-
• APAF 05 Line Item B01B00: <i>B-1B</i>	0.000	0.000	0.000	-	0.000	-	-	-	-	-	-
• OPAF 03 Line Item 834010:	0.180	1.698	1.701	-	1.701	-	-	-	-	-	-
<i>General Information Technology</i>											

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 0604281F / <i>Tactical Data Networks Enterprise</i>	Project (Number/Name) 655262 / <i>Family of Gateways</i>

C. Other Program Funding Summary (\$ in Millions)

<u>Line Item</u>	<u>FY 2020</u>	<u>FY 2021</u>	<u>FY 2022</u> <u>Base</u>	<u>FY 2022</u> <u>OCO</u>	<u>FY 2022</u> <u>Total</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>FY 2026</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
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Remarks

D. Acquisition Strategy

The Airborne Networking Directorate provides for common development, integration and interoperability across the entire airborne network and ensures that data links are procured and maintained as a joint, end-to-end, command and control system. Platform acquisition strategies vary by program, but the majority of development and integration is normally accomplished by the weapon system prime contractor. Contract approaches vary by program.

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Exhibit R-4, RDT&E Schedule Profile: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 0604281F / <i>Tactical Data Networks Enterprise</i>	Project (Number/Name) 655262 / <i>Family of Gateways</i>

FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

<i>5th-to-4th Generation Gateway</i>	
5th-to-4th Generation Gateway Development	

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Exhibit R-4A, RDT&E Schedule Details: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 0604281F / <i>Tactical Data Networks Enterprise</i>	Project (Number/Name) 655262 / <i>Family of Gateways</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>5th-to-4th Generation Gateway</i>				
5th-to-4th Generation Gateway Development	1	2020	3	2021

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 0604287F / <i>Physical Security Equipment</i>
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COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
Total Program Element	-	11.122	6.740	8.469	0.000	8.469	-	-	-	-	-	-
655120: <i>Physical Security Equipment - SD ED</i>	-	11.122	6.740	8.469	0.000	8.469	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-	-	-

A. Mission Description and Budget Item Justification

The Physical Security Equipment (PSE) program provides for Air Force Integrated Base Defense Security Systems (IBDSS) improvements and enhancements, to include the demonstration and testing of PSE systems related to Force Protection. This program supports the protection of tactical, fixed, and nuclear weapons systems, AF personnel and AF facilities. The PSE program includes spectrum planning for radio frequency (RF), communication security (cyber), information assurance requirements, integration and interoperability command control & communication (3) platform & components. This Program Element also includes funding for Force Protection Commercial Off the Shelf (FP COTS) market research, evaluation and testing. Force Protection programs are inherently subject to rapid changes in the operational environment and will retain sufficient Program flexibility to meet changes in location, scope and capability in order to protect Air Force people, facilities and warfighting assets. The Defender Multi-Domain Command, Control and Communications (DMDC3) is an initiative developing the foundational structure of IBDSS to provide a platform that integrates the computing power, the means of communication, and the tools for situational awareness. PSE efforts support Modular Open Source Architecture (MOSA) standards to enable faster installations and greater interoperability to address the Chief of Staff of the Air Force (CSAF's) 'Fight the Base' goals. Air Base Ground Defense (ABGD) supports all Developmental Testing, Evaluation, Integration, Certification, and Proof of Concept for technology integration management and interoperability.

IBDSS FY22 developmental efforts will continue to evaluate and test state-of-the art technology to support integrated based security systems installations worldwide, continue to improve and integrate COTS efforts into IBDSS physical security equipment, as well as further develop, integrate and test Defender Multi-Domain Command, Control and Communications (DMDC3) software applications.

Airbase Air Defense Systems (ABADS)

Airbase Air Defense Systems (ABADS) is the principal Air Force Counter-small Unmanned Aircraft System (C-sUAS) USAF program to defend against the emerging and growing small unmanned aerial system threat. This program protects strategic assets vital to national security when bedded down and when on the move. It also protects personnel deployed in theater. ABADS also includes efforts related to Counter rocket, artillery, and mortar (C-RAM) that provide an early, dependable warning of incoming rocket, artillery and mortar threats to enable quick action to protect base personnel and base assets. In FY 2021 the C-sUAS program transitions to Airbase Air Defense Systems (ABADS) PE 27522F and WSC 640410.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver Base Physical Security System capabilities for emergent or unanticipated weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program element 0605831F.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 0604287F / <i>Physical Security Equipment</i>
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In FY19 \$0.00M and in FY20 \$0.263M was expended for civilian pay expenses in this program element. In FY21 \$0.994M is forecasted for civilian pay expenses in this program element.

The FY 2020 funding currently does not show the 1.6 million reprogramming increase for the C-RAM UON.

This program is in Budget Activity 5, System Development and Demonstration (SDD) because it has passed Milestone B approval and is conducting engineering and manufacturing development tasks aimed at meeting validated requirements prior to full rate production.

B. Program Change Summary (\$ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Previous President's Budget	8.278	6.752	10.261	0.000	10.261
Current President's Budget	11.122	6.740	8.469	0.000	8.469
Total Adjustments	2.844	-0.012	-1.792	0.000	-1.792
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	1.667	0.000			
• SBIR/STTR Transfer	-0.245	0.000			
• Other Adjustments	1.422	-0.012	-1.792	0.000	-1.792

Congressional Add Details (\$ in Millions, and Includes General Reductions)

Project: 655120: *Physical Security Equipment - SD ED*

Congressional Add: *Counter-small Unmanned Aircraft Systems (C-sUAS) Joint Urgent Operational Need (JUON)- EUCOM*

Congressional Add Subtotals for Project: 655120

Congressional Add Totals for all Projects

	FY 2020	FY 2021
	0.000	0.000
	0.000	0.000
	0.000	0.000

Change Summary Explanation

FY 2020 includes \$1.667M reprogramming increase for the C-RAM UON and \$0.245M transfer for SBIR. Our total current PB is \$11.122M

C. Accomplishments/Planned Programs (\$ in Millions)

	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Title: IBDSS-2	11.122	6.740	8.469	0.000	8.469

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force	Date: May 2021
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Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 0604287F / <i>Physical Security Equipment</i>
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C. Accomplishments/Planned Programs (\$ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
<p>Description: IBDSS-2 (Integrated Base Defense Security Systems) qualifies, demonstrates, and tests Physical Security Equipment (PSE) systems to include Force Protection. This continuing effort was previously named Physical Security Equipment.</p> <p>FY 2021 Plans:</p> <ul style="list-style-type: none"> -Conducting evaluation and testing to address capability gaps and obsolescence to include, but not limited to Force Protection Commercial Off The Shelf (COTS). -Conducting integration and testing to qualify COTS equipment to provide essential upgrades/improvements and state-of the art technology to support integrated based security systems installations worldwide. -Integrate and/or modify COTS efforts to improve IBDSS physical security equipment -Developing, integrating and testing Defender Multi-Domain Command, Control and Communications (DMDC3) software applications -Developing an air base optimized solution for early, dependable warning of incoming rocket, artillery and mortar threats in support of a C-RAM UON. Upon completion, system will be tested to validate performance requirements. <p>FY 2022 Base Plans:</p> <ul style="list-style-type: none"> -Will Continue to conduct market research, evaluation and testing to address capability gaps and obsolescence to include, but not limited to Force Protection Commercial Off The Shelf (COTS) -Will continue further integration and testing to qualify COTS equipment to provide essential upgrades/improvements and state-of the art technology to support integrated based security systems installations worldwide. -Will continue with the integration and/or modification to COTS efforts to improve IBDSS physical security equipment -Will continue further development, integration and testing Defender Multi-Domain Command, Control and Communications (DMDC3) software applications. <p>FY 2022 OCO Plans: N/A</p> <p>FY 2021 to FY 2022 Increase/Decrease Statement: Additional funding will address on-going COTS and DMDC3 development efforts.</p>					
<p>Title: Counter-small Unmanned Aircraft System (C-sUAS) protection capabilities at downward selected high priority sites.</p>	0.000	0.000	0.000	0.000	0.000

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600: Research, Development, Test & Evaluation, Air Force I BA 5: System Development & Demonstration (SDD)	R-1 Program Element (Number/Name) PE 0604287F I Physical Security Equipment
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C. Accomplishments/Planned Programs (\$ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Description: Counter-small Unmanned Aircraft System (C-sUAS) protection capabilities at downward selected high priority sites. FY 2021 Plans: N/A FY 2022 Base Plans: N/A FY 2022 OCO Plans: N/A					
Accomplishments/Planned Programs Subtotals	11.122	6.740	8.469	0.000	8.469

	FY 2020	FY 2021
Congressional Add: Counter-small Unmanned Aircraft Systems (C-sUAS) Joint Urgent Operational Need (JUON)- EUCOM FY 2020 Accomplishments: N/A FY 2021 Plans: N/A	0.000	0.000
Congressional Adds Subtotals	0.000	0.000

D. Other Program Funding Summary (\$ in Millions)											
<u>Line Item</u>	<u>FY 2020</u>	<u>FY 2021</u>	<u>FY 2022 Base</u>	<u>FY 2022 OCO</u>	<u>FY 2022 Total</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>FY 2026</u>	<u>Cost To Complete</u>	<u>Total Cost</u>
• OPAF 03 Line Item 29: Base Physical Security Systems	185.684	39.601	44.812	-	44.812	-	-	-	-	-	-

Remarks

E. Acquisition Strategy
 AFSFC and Force Protection program office investigates requirements to include new and/or obsolete items. COTS sub-systems, equipment and components are competitively acquired from industry after thorough market research. Equipment for testing is purchased via competitive selection processes via direct purchase orders. For security systems COTS that are required to be qualified for nuclear security environments where industry COTS sources may not be mature, consideration is given to replacement of new items or modification of COTS through the competitive selection procedure as well.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 0604287F / <i>Physical Security Equipment</i>
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Delivery Orders on Indefinite Delivery/Indefinite Quantity contract vehicles or other approved purchase methods are utilized to acquire equipment.

The Force Protection program office is developing new capabilities, updating existing capabilities, exploring and fielding COTS capabilities, primarily, but not exclusively through a Mid-Tier Acquisition program.

Notional strategy to deploy Defender Multi-Domain Command, Control and Communications (DMDC3) and IBDSS of the future. DMDC3 Pathfinder operations at Vindicator and Advantor IDS Systems at various bases.

Counter rocket, artillery, and mortar (C-RAM) provides early, dependable warning of incoming rocket, artillery and mortar threats to enable quick action to protect base personnel and base assets. Supports Modular Open Source Architecture (MOSA) standards to enable faster installations and greater interoperability to enable Chief of Staff of the Air Force (CSAF's) 'Fight the Base' goals. C-RAM emphasizes leveraging existing Air Force contracts for development, integration, and installation work in order to support accelerated Urgent Operational Need (UON) fielding timelines.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 0604287F / <i>Physical Security Equipment</i>	Project (Number/Name) 655120 / <i>Physical Security Equipment - SD ED</i>
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Product Development (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Integrated Base Defense Security Systems (IBDSS-2)	Various	Various : Various	-	1.881	Jun 2020	2.892	Dec 2020	1.097	Nov 2021	-		1.097	-	-	-
Subtotal			-	1.881		2.892		1.097		-		1.097	-	-	N/A

Support (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Integrated Base Defense Security Systems (IBDSS-2)	Various	Various : Various	-	1.920	Jul 2020	2.094	Dec 2020	1.668	Dec 2021	-		1.668	-	-	-
Subtotal			-	1.920		2.094		1.668		-		1.668	-	-	N/A

Remarks
The support funding is planned at the above amounts. If the support contracts are less, the available funds will be transitioned to the Product Development line.

Test and Evaluation (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Integrated Base Defense Security Systems (IBDSS-2)	Various	Various : Various	-	7.321	Mar 2020	1.754	Feb 2021	5.704	Feb 2022	-		5.704	-	-	-
Subtotal			-	7.321		1.754		5.704		-		5.704	-	-	N/A

	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals		-	11.122	6.740	8.469	8.469	-	-	N/A

Remarks
Various delivery orders will be awarded through out the fiscal year for numerous projects.

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Exhibit R-4, RDT&E Schedule Profile: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 0604287F / <i>Physical Security Equipment</i>	Project (Number/Name) 655120 / <i>Physical Security Equipment - SD ED</i>

	FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

FY20 Events																													
Integrated Base Defense Security Systems (IBDSS-2)	██████████																												
FY21 Events																													
Integrated Base Defense Security Systems (IBDSS-2)					██████████																								
FY22 Events																													
Integrated Base Defense Security Systems (IBDSS-2)									██████████																				

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Exhibit R-4A, RDT&E Schedule Details: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 0604287F / <i>Physical Security Equipment</i>	Project (Number/Name) 655120 / <i>Physical Security Equipment - SED</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>FY20 Events</i>				
Integrated Base Defense Security Systems (IBDSS-2)	1	2020	4	2020
<i>FY21 Events</i>				
Integrated Base Defense Security Systems (IBDSS-2)	1	2021	4	2021
<i>FY22 Events</i>				
Integrated Base Defense Security Systems (IBDSS-2)	1	2022	4	2022

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 0604329F / <i>Small Diameter Bomb (SDB) - EMD</i>
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COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
Total Program Element	1,211.038	44.530	0.000	0.000	0.000	0.000	-	-	-	-	-	-
655191: <i>SDB Increment II</i>	1,211.038	44.530	0.000	0.000	0.000	0.000	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-	-	-

Program MDAP/MAIS Code: 439

Note

In FY 2021, PE 0604329F, BA05, Project Small Diameter Bomb(SDB)-EMD efforts were transferred to PE 0207327F, BA07, Project Small Diameter Bomb (SDB), due to SDB II completion of BA05: System Development & Demonstrations(SDD) SDB moved to Operational Systems Development BA07.

A. Mission Description and Budget Item Justification

GBU-53/B Small Diameter Bomb Increment II (SDB II) StormBreaker is a joint interest United States Air Force (USAF) and Department of Navy (DoN) Acquisition Category (ACAT) IC program, with the USAF as the lead service. SDB II addresses the following warfighter requirements: attack moving and stationary targets; adverse weather operations; multiple ordnance carriage; precision munitions capability; reduced munitions footprint; increased weapons effectiveness; minimized potential for collateral damage; reduced susceptibility of munitions to countermeasures; and provides a network-enabled weapon capability via Link-16 and Ultra High Frequency (UHF) weapon data link. SDB II is a key component of the Air Force Global Strike Task Force Concept of Operations (CONOPs). The threshold aircraft for the USAF is the F-15E, and the threshold aircraft for the DoN are the F-35B and F-35C. Objective aircraft include the F-22, F-16, F-35A, B-2, A-10, MQ-9, B-1, B-52, AC-130 and the F/A-18E/F. SDB II is compatible with the Bomb Rack Unit-61 (BRU-61) miniature munitions carriage, Type II carriage systems, the Container Numerical Unit-660/E (CNU-660/E) carriage system, the Common Munitions Built In Test (BIT)/Reprogramming Equipment (CMBRE), and the Joint Mission Planning System (JMPS). SDB II will develop and field a single weapon storage container (USAF) and a dual weapon storage container (DoN).

SDB II completed a competitive Risk Reduction in October 2009 and entered Milestone B Engineering and Manufacturing Development (EMD) in August 2010. A Fixed Price Incentive Firm EMD contract with five options for annual Low Rate Initial Production (LRIP) lots (FY15-FY19) was awarded in August 2010. SDB II received Milestone C approval to enter LRIP in June 2015 and completed an Acquisition Program Baseline update. Contract options for LRIP Lots 1-5 have been exercised. Initial Operational Test and Evaluation (IOT&E) started June 2018 and completed December 2019. SDB II was fielded for the F-15E in September 2020. Initial Operational Capability (IOC) for the DoN's F-35B and F-35C is scheduled for FY 2023 and is based on the F-35 B/C hardware and software modification schedule. DoN's first production lot (Lot 4/FY19) supports F/A-18E/F IOC.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver weapon system capability. The use of such programs funds would be in addition to the civilian pay expenses budgeted in program element 0605831F. In FY20 \$0.017M was expended for civilian pay expenses in this program element, and in FY21 \$0M is forecasted for civilian pay expenses in this program element.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 0604329F / <i>Small Diameter Bomb (SDB) - EMD</i>
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This program is in Budget Activity 5, System Development and Demonstration (SDD) because it has passed Milestone B approval and is conducting engineering and manufacturing development tasks aimed at meeting validated requirements prior to full rate production.

B. Program Change Summary (\$ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Previous President's Budget	45.241	17.280	27.386	0.000	27.386
Current President's Budget	44.530	0.000	0.000	0.000	0.000
Total Adjustments	-0.711	-17.280	-27.386	0.000	-27.386
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	-1.606	0.000			
• Other Adjustments	0.895	-17.280	-27.386	0.000	-27.386

Congressional Add Details (\$ in Millions, and Includes General Reductions)

Project: 655191: *SDB Increment II*

Congressional Add: *Precise Navigation*

Congressional Add: *SDB II Tech Refresh*

Congressional Add Subtotals for Project: 655191

Congressional Add Totals for all Projects

	FY 2020	FY 2021
	4.000	0.000
	10.000	0.000
Congressional Add Subtotals for Project: 655191	14.000	0.000
Congressional Add Totals for all Projects	14.000	0.000

Change Summary Explanation

FY21 and FY22 funding decreased as a result of PE 0604329F, BA05, Project Small Diameter Bomb(SDB)-EMD efforts being transferred to PE 0207327F, BA07, Project Small Diameter Bomb (SDB), due to SDB II completion of BA05: System Development & Demonstrations(SDD) SDB moved to Operational Systems Development BA07.

C. Accomplishments/Planned Programs (\$ in Millions)

	FY 2020	FY 2021	FY 2022
Title: SDB II Development and Engineering Changes	19.108	0.000	0.000
Description: Development activities to deliver capabilities in the SDB II Capability Development Document (CDD). Design, develop, integrate, model, test, and qualify engineering changes to SDB II baseline hardware and software to meet emerging threat, new technologies and to maintain compatibility with external systems. Activities include, but are not limited to, DoD-			

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force		Date: May 2021	
Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 5: System Development & Demonstration (SDD)</i>		R-1 Program Element (Number/Name) PE 0604329F / <i>Small Diameter Bomb (SDB) - EMD</i>	
C. Accomplishments/Planned Programs (\$ in Millions)		FY 2020	FY 2021
mandated data link cryptographic modernization, program protection, exportability features, cyber security, advanced guidance, navigation and control, enhanced lethality, precise/advance navigation, and address obsolescence issues and affordability opportunities. Conduct trade studies and concept development for technology refresh redesigns as based on obsolescence forecasts.			
FY 2021 Plans: N/A			
FY 2022 Plans: N/A			
FY 2021 to FY 2022 Increase/Decrease Statement: N/A			
Title: SDB II M-Code		11.422	0.000
Description: M-Code provides an enhanced anti-jam capability and secures access to military GPS signals. Activities include, but are not limited to, design, development, test and qualification of engineering changes to the SDB II system required for M-Code, and enhanced anti-jam capability. M-Code will provide the ability to operate in increasing adversarial anti-access/area-denial (A2/AD) jamming environments with increased accuracy, better signal acquisition, and enhanced security features.			
FY 2021 Plans: N/A			
FY 2022 Plans: N/A			
FY 2021 to FY 2022 Increase/Decrease Statement: N/A			
Accomplishments/Planned Programs Subtotals		30.530	0.000
		FY 2020	FY 2021
Congressional Add: Precise Navigation		4.000	0.000
FY 2020 Accomplishments: Continue design, integration, test, and down-select candidate seeker-based algorithms suitable for operation in a GPS denied environment. Currently the program is integrating algorithms into the Integrated Flight Simulator (IFS) to initially characterize performance over various ranges and terrains.			

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 0604329F / <i>Small Diameter Bomb (SDB) - EMD</i>
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	FY 2020	FY 2021
Efforts anticipate Captive Flight Test (CFT) data collection, and subsequent evaluation of algorithm candidates' performances in order to down-select. FY 2021 Plans: N/A		
Congressional Add: SDB II Tech Refresh FY 2020 Accomplishments: The SDB II Tech Refresh thrust supports the Seeker Cost Reduction Initiative and is a multi-year initiative to increase system affordability, protect our ability to produce and operate, and increase weapon value for the warfighter. This includes, but may not be limited to, reducing the cost of the seeker and other components, subsystems, and assemblies within the weapon and associated system-of-systems; mitigating or responding to Diminishing Manufacturing Sources and Material Shortages (DMSMS); solidifying and/or increasing competition within the supplier industrial base; maximizing operational weapon effectiveness and value through capability enhancements and countering emerging threats; and improving supportability, handling, mission planning and human machine interface. Conduct Analysis of Alternatives to evaluate redesign of the seeker and/or other components and subsystems within the weapon; evaluate supplier and assembly cost reduction; develop a technology roadmap for system affordability, predictability and operational improvements; analyze system requirements and conduct a Systems Requirements Review; mature key technologies and reduce risk for preferred alternatives; and develop and test software enhancements to provide near and/or longer term performance enhancements to maximize warfighter value for fielded or future weapons. Work may also extend beyond the weapon into the SDB II system-of-systems to improve operational effectiveness, operator reliability, aircraft integration, mission planning and human machine interface. FY 2021 Plans: N/A	10.000	0.000
Congressional Adds Subtotals	14.000	0.000

D. Other Program Funding Summary (\$ in Millions)

Line Item	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
• MPAF 02 Line Item SDB002: <i>Small Diameter Bomb II</i>	183.279	209.972	294.649	-	294.649	-	-	-	-	-	-
• RDTE 07 0207327F: <i>Small Diameter Bomb (SDB) - EMD</i>	-	20.780	27.109	-	27.109	-	-	-	-	-	-

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force	Date: May 2021
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Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 0604329F / <i>Small Diameter Bomb (SDB) - EMD</i>
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D. Other Program Funding Summary (\$ in Millions)

<u>Line Item</u>	<u>FY 2020</u>	<u>FY 2021</u>	<u>FY 2022</u> <u>Base</u>	<u>FY 2022</u> <u>OCO</u>	<u>FY 2022</u> <u>Total</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>FY 2026</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• RDTE 05 PE 0604329N: <i>Small Diameter Bomb II</i>	44.372	55.275	42.297	-	42.297	-	-	-	-	-	-
• WPN Line Item 223800: <i>Small Diameter Bomb II</i>	108.452	7.824	80.575	-	80.575	-	-	-	-	-	-

Remarks

DoN RDT&E funds include F-35B and F-35C Integration and Support Cost.

E. Acquisition Strategy

The SDB II Engineering and Manufacturing Development (EMD) contract was awarded using competitive procedures. At the completion of the 42-month Risk Reduction phase in October 2009, one contractor was selected in April 2010 and awarded the EMD contract in August 2010. The EMD contract is a Fixed-Price Incentive Firm (FPIF) contract with priced production options for the first five production lots. SDB II production Lots 1-3 are FPIF. Production Lots 4-5 are firm fixed price. The Government is buying the SDB II based on the contractor System Performance Specification (SPS) which has been approved by the Government. The contractor is accountable for system performance as defined in the SPS and a system warranty as defined in the EMD contract and follow-on production contracts. Accordingly, the contractor is accountable to the Government for the design of the weapon system, as well as the planning and execution of the Development Test and Evaluation (DT&E) program to verify system performance. The Government formally arranges and funds the use of Government flight test support for DT&E and OT&E.

In September 2017, the Government awarded a sole source indefinite delivery indefinite quantity (IDIQ) contract to Raytheon Missile Systems to design, develop, integrate, model, test, and qualify engineering changes to SDB II baseline hardware and software to meet emerging threats and to maintain compatibility with external systems. Activities include, but are not limited to M-Code GPS, data link cryptographic modernization, program protection, exportability features, cyber security, advanced guidance, navigation and control, enhanced lethality, and address obsolescence issues and affordability opportunities.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 0604329F / Small Diameter Bomb (SDB) - EMD	Project (Number/Name) 655191 / SDB Increment II
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Product Development (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Risk Reduction Contract 1	C/CPFF	Boeing : St. Louis, MO	151.922	-		-		-		-		-	-	-	-
Risk Reduction Contract 2	C/CPFF	Raytheon : Tucson, AZ	150.800	-		-		-		-		-	-	-	-
EMD Contract	C/FPIF	Raytheon : Tucson, AZ	460.169	-		-		-		-		-	-	-	-
Engineering Changes & Technical Support	SS/ Various	Raytheon : Tucson, AZ	153.538	29.381	Dec 2019	-		-		-		-	-	-	136.520
M-Code Integration	SS/ Various	Raytheon : Tucson, AZ	49.712	11.422	Mar 2020	-		-		-		-	-	-	109.437
IMPACT High Pressure Air Compressor System	SS/FFP	Boeing : St. Charles, MO	3.175	-		-		-		-		-	-	-	-
F-15E Integration & Test Support	SS/ Various	Boeing : St. Louis, MO	52.116	1.027	Jun 2020	-		-		-		-	-	-	49.762
BRU-61/A Integration and Test Support	SS/ Various	Boeing : St. Louis, MO	8.529	-		-		-		-		-	-	-	-
Mission Planning	Various	Various : Various	5.732	-		-		-		-		-	-	-	5.832
Data Link Integration & Support	Various	Various : Various	3.004	-		-		-		-		-	-	-	-
System Performance & Lethality	Various	Various : Various	38.950	-		-		-		-		-	-	-	39.334
Other Product Development	Various	Various : Various	11.796	-		-		-		-		-	-	-	69.594
Subtotal			1,089.443	41.830		-		-		-		-	-	-	N/A

Remarks
 Engineering Changes and Technical Support: upgrades to SDB II baseline hardware/software to meet emerging threats and to maintain compatibility with external systems. Activities include, but are not limited to, data link cryptographic modernization, program protection, exportability, cyber security, advanced guidance, navigation and control, enhanced lethality, and address obsolescence issues and affordability opportunities.

The increase in F-15E Integration and Test Support in FY22 is due to the biennial weapon OFP update.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 0604329F / Small Diameter Bomb (SDB) - EMD	Project (Number/Name) 655191 / SDB Increment II
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Support (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Support	C/CPAF	Not specified. : TBD	0.000	-		-		-		-		-	-	-	-
Other Government Costs	Various	Various : Various	6.376	0.000		-		-		-		-	-	-	8.201
Subtotal			6.376	0.000		-		-		-		-	-	-	N/A

Remarks
Other Gov't Costs: Command & Control Infrastructure Integration subject matter expert (SME) support

Test and Evaluation (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Test and Evaluation	C/CPAF	Not specified. : TBD	0.000	-		-		-		-		-	-	-	-
DT&E	PO	96th Test Wing : Eglin AFB, FL	34.410	1.632	Dec 2019	-		-		-		-	-	-	33.725
DT&E: UTTR, WSMR	Various	Various : Various	10.304	-		-		-		-		-	-	-	-
Targets	Various	Various : Various	25.648	-		-		-		-		-	-	-	-
Other Test Support	Various	Various : Various	9.263	-		-		-		-		-	-	-	11.896
Subtotal			79.625	1.632		-		-		-		-	-	-	N/A

Remarks
UTTR: Utah Test and Training Range
WSMR: White Sands Missile Range

Management Services (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Management Services	C/CPAF	Not specified. : TBD	0.000	-		-		-		-		-	-	-	-
Engineering Professional Administrative Support Services (EPASS)	Various	Various : Eglin AFB, FL	24.008	0.750	Jun 2020	-		-		-		-	-	-	25.508

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 0604329F / Small Diameter Bomb (SDB) - EMD	Project (Number/Name) 655191 / SDB Increment II
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Management Services (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Program Management Administration (PMA)	Various	Various : Eglin AFB, FL	11.586	0.318	Oct 2019	-		-		-		-	-	-	11.536
Subtotal			35.594	1.068		-		-		-		-	-	-	N/A

Remarks
PMA: Other government costs (travel, Government Purchase Card (GPC), equipment supplies, and IT support)

	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	1,211.038	44.530	0.000	-	-	-	-	-	N/A

Remarks
Engineering Changes: upgrades to SDB II baseline hardware/software to meet emerging threats, maintain compatibility with external systems and improve system performance. Activities include, but are not limited to, data link cryptographic modernization, program protection, exportability, cyber security, advanced guidance, navigation and control, enhanced lethality, and address obsolescence issues and affordability opportunities.

FINANCIAL PERFORMANCE: SDB II is evaluated against traditional Research and Development (R&D) program expenditure benchmarks. However, the SDB II LRIP contract is a FPIF contract with progress payments. A percent of incurred costs are withheld until the end of the contract, when they are liquidated. Mandatory funding obligations and progress payment withholds will cause the program to lag traditional expenditure benchmarks, painting an inaccurate portrait of overall program health.

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Exhibit R-4, RDT&E Schedule Profile: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 0604329F / <i>Small Diameter Bomb (SDB)</i>) - <i>EMD</i>	Project (Number/Name) 655191 / <i>SDB Increment II</i>

FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

<i>SDB Increment II</i>	
F-15E Integration & Test Support	
M-Code Integration & Testing	
Data Link Crypto Mod Integration & Testing	
Integration & Testing on Threshold F-35B/C	
Precision Navigation	
SDB II Tech Refresh	

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Exhibit R-4A, RDT&E Schedule Details: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 0604329F / <i>Small Diameter Bomb (SDB)</i>) - EMD	Project (Number/Name) 655191 / <i>SDB Increment II</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>SDB Increment II</i>				
F-15E Integration & Test Support	2	2020	4	2022
M-Code Integration & Testing	1	2020	2	2025
Data Link Crypto Mod Integration & Testing	1	2020	4	2023
Integration & Testing on Threshold F-35B/C	1	2020	4	2023
Precision Navigation	1	2020	3	2022
SDB II Tech Refresh	4	2020	3	2021

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 0604602F / <i>Armament/Ordnance Development</i>
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COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
Total Program Element	-	29.505	23.034	9.047	0.000	9.047	-	-	-	-	-	-
653133: <i>Bombs & Fuzes</i>	-	20.528	17.969	3.950	0.000	3.950	-	-	-	-	-	-
655361: <i>Stores-Aircraft Interface</i>	-	8.977	5.065	5.097	0.000	5.097	-	-	-	-	-	-

A. Mission Description and Budget Item Justification

The Armament Ordnance Development program provides for the initial and continuing development of weapons, munitions, and munitions equipment for aircraft integration, support, and operational use. This program develops, characterizes, and improves current, future, and legacy munitions, ammunitions, and subsystems.

653133: The Bombs & Fuzes project improves conventional weapons/munitions (kinetic and non-kinetic), fuzes, and height-of-burst sensors (HOBS), and develops and integrates complementary position, navigation, and timing (PNT) capabilities (i.e. GPS, non-GPS, optical, passive, active, etc.). It also provides for the development and testing necessary for a suitable manufacturing base of conventional warheads, fuzes, HOBS, and munitions materiel handling equipment (MMHE). Bombs & Fuzes also provides research, development, testing and guidance of conventional warheads, fuzing, HOBS modifications, and anti-personnel anti-materiel (APAM) weapons to improve lethality against area, mobile, hard and deeply buried, and fixed targets. Finally, this project provides an opportunity to quickly insert emerging technologies into existing and developing aircraft munitions and fuzes and supports strategic planning to achieve compliance of AF munitions with Department of Defense insensitive munitions (IM) standards.

655361: The Stores-Aircraft Interface project is home to the Universal Armament Interface (UAI). UAI is the Air Force's common standard aircraft/weapon interface and is an acquisition requirement, to be used by all weapons and combat aircraft as practicable. The UAI program continues development and maintenance of the standardized interface including mission planning components. Users include Air Force, Army, and Navy customers. The UAI program office is also responsible for development, enhancement, and maintenance of the standard to support coalition, allied, and joint interoperability efforts for weapons-platform interface. These responsibilities include acquisition, upgrade, repair and provision of UAI certification tools, and implementation support to US Air Force, Army, Navy and allied aircraft and weapons systems. UAI provides cost/schedule savings over traditional integration efforts. This is accomplished by enabling integration of weapons independent of aircraft Operational Flight Programs (OFP) cycles.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver weapon system capability. The use of such programs funds would be in addition to the civilian pay expenses budgeted in program element 0605831F. In FY20 \$0M was expended for civilian pay expenses in this program element, and in FY21 \$0.135M is forecasted for civilian pay expenses in this program element.

This program is in Budget Activity 5, System Development and Demonstration (SDD) because it has passed Milestone B approval and is conducting engineering and manufacturing development tasks aimed at meeting validated requirements prior to full rate production.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force	Date: May 2021
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Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 0604602F / <i>Armament/Ordnance Development</i>
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B. Program Change Summary (\$ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Previous President's Budget	28.043	23.076	9.183	0.000	9.183
Current President's Budget	29.505	23.034	9.047	0.000	9.047
Total Adjustments	1.462	-0.042	-0.136	0.000	-0.136
• Congressional General Reductions	0.000	-0.042			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	1.500	0.000			
• SBIR/STTR Transfer	-0.038	0.000			
• Other Adjustments	0.000	0.000	-0.136	0.000	-0.136

Change Summary Explanation

FY20 Reprogramming funding was allocated to IM/Emerging Technologies

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 0604602F / <i>Armament/Ordnance Development</i>	Project (Number/Name) 653133 / <i>Bombs & Fuzes</i>
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COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
653133: <i>Bombs & Fuzes</i>	-	20.528	17.969	3.950	0.000	3.950	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-	-	-

A. Mission Description and Budget Item Justification

The Bombs & Fuzes project improves conventional weapons/munitions (kinetic and non-kinetic), fuzes, and height-of-burst sensors (HOBS), and develops and integrates complementary position, navigation, and timing (PNT) capabilities (i.e. GPS, non-GPS, optical, passive, active, etc.). This project also provides an opportunity to quickly insert emerging technologies into existing and developing aircraft munitions and fuzes. Bombs & Fuzes provides research, development, and testing of conventional warheads, fuzing, HOBS modifications, and anti-personnel anti-materiel (APAM) weapons to improve lethality against area, mobile, hard and deeply buried, and fixed targets. This project provides for the development and testing necessary to provide a suitable manufacturing base of conventional warheads, fuzes, HOBS, and munitions materiel handling equipment (MMHE).

- Munitions Materiel Handling Equipment (MMHE): MMHE is a continuing project to develop and improve the standardization and commonality of munitions handling and armament equipment to preclude duplication. Efforts are primarily the study, design, and development of MMHE and armament control systems; however, support may be provided to other functional areas as requested. Procurement will be performed and funded by the applicable weapons system project.

- Medium Caliber Ammunition project assesses, refines, and develops medium caliber ammunition, to include, but not limited to, conducting 25mm (F-35) qualification testing, comparative testing, and mitigating ammunition inventory health issues.

- Insensitive Munitions (IM) and Emerging Technologies: IM projects support AF IM strategic planning to achieve IM compliance IAW U.S. Code, Title 10, Subtitle A, Part N, Chapter 141, Section 2389, ensuring safety regarding insensitive munitions. Models and validates current munition performance, integrates less sensitive explosive fills, addresses IM explosive fill deficiencies, and develops bomb case modifications to improve the response of conventional weapons to unplanned stimuli. This project also explores and develops IM and Energetics technology, assessing, analyzing, and evaluating emerging and developed technologies for future and existing weapon and fuze capabilities to improve lethality, accuracy, and reliability in accordance with the National Defense Strategy roadmap.

- Next Generation Area Attack Weapons (NGAAWs) are a family of unitary area attack weapon capabilities to meet the DoD policy regarding cluster munitions and unintended harm to civilians. They consist of BLU-134/B and BLU-136/B warheads with a height of burst sensor. BLU-134/B Improved Lethality Warhead (ILW), NGAAW Increment I, is a near-term solution for area attack as an anti-personnel anti-materiel (APAM) weapon that improves lethality using a 500 lb warhead design and any variants. The BLU-136/B NGAAW Increment II continues development to provide significantly increased capability and lethality against area targets as an APAM weapon. This effort is being executed using an accelerated acquisition strategy to study, design, develop, and test a 2,000 lb unitary warhead design and any variants based on target sets.

- DSU-43/B Cockpit-selectable Height-Of-Burst Sensor (C-HOBS): The C-HOBS will be a replacement for the current DSU-33D/B proximity sensor. C-HOBS will replace the single factory height-of-burst setting with the addition of multiple height-of-burst options selectable via both manual switches and a cockpit interface. These selection

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 0604602F / <i>Armament/Ordnance Development</i>	Project (Number/Name) 653133 / <i>Bombs & Fuzes</i>
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options allow flexibility during flight to address a wide array of targets. The C-HOBS is intended to interface with Combat Air Forces (CAF) aircraft and provide proximity height-of-burst functionality to general and special purpose weapons (to include NGAAWs).

- Joint Air-to-Ground Missile for Fixed Wing Aircraft (JAGM-F) is an improvement to the Army-led JAGM, which will allow the missile to be ejected from fixed wing aircraft in order to eliminate time sensitive moving targets and high value covered/sheltered targets. JAGM-F will be able to combat adverse weather/low visibility battlefield and countermeasure environments as well as austere communication environments. JAGM-F will have the ability to engage multiple target types near-simultaneously in multiple engagement modes. Efforts include but are not limited to capability demonstration design, testing, and qualification, and manufacture/build components to production standards. Intent is to investigate meeting all BRU-55, BRU-70, and BRU-61 environments.

B. Accomplishments/Planned Programs (\$ in Millions)

	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
<p>Title: Munitions Materiel Handling Equipment (MMHE)</p> <p>Description: Armament Standardization/Control/Munitions Materiel Handling Equipment (MMHE) is a continuing project to develop and improve the standardization and commonality of munitions handling and armament equipment to preclude duplication. Efforts are primarily the study, design, and development of MMHE and armament control systems; however, support may be provided to other functional areas as requested. Procurement will be performed and funded by the applicable weapons system project.</p> <p>FY 2021 Plans: Continue MMHE support projects to include engineering, drafting, proof load, technical data, and safety authorizations. Fabricate prototypes for test and evaluation purposes. Continue first article equipment fabrications for drafting verification and delivery to Air Force units for additional test and evaluation. Provide support to all system program offices with new weapons and aircraft configurations, as needed. Continue support to the F-35 with designs and manufacturing of equipment to aid safe munitions loading and handling of various pylons and adapters. Continue to support the B-21 program office with evaluations and recommendations for equipment to aid safe munitions loading and handling of various pylons and adapters. Continue support to Defense Advanced Research Projects Agency (DARPA) with designs and manufacturing of equipment to aid safe munitions loading and handling of hypersonic weapons. Continue support for Air Force Research Laboratory on future munition concept demonstrators. Continue support and sustainment engineering of all previously existing items developed by the MMHE program office. Continue to provide MMHE Sustainment office at Robins AFB, GA, with engineering support.</p> <p>FY 2022 Base Plans: Continue MMHE support projects to include engineering, drafting, proof load, technical data, and safety authorizations. Fabricate prototypes for test and evaluation purposes. Continue first article equipment fabrications for drafting verification and delivery to Air Force units for additional test and evaluation. Provide</p>	0.774	0.614	0.664	-	0.664

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force			Date: May 2021		
Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 0604602F / <i>Armament/Ordnance Development</i>	Project (Number/Name) 653133 / <i>Bombs & Fuzes</i>			
B. Accomplishments/Planned Programs (\$ in Millions)					
	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
support to all system program offices with new weapons and aircraft configurations, as needed. Continue support to the F-35 with designs and manufacturing of equipment to aid safe munitions loading and handling of various pylons and adapters. Continue to support the B-21 program office with evaluations and recommendations for equipment to aid safe munitions loading and handling of various pylons and adapters. Continue support to DARPA with designs and manufacturing of equipment to aid safe munitions loading and handling of hypersonic weapons. Continue support for Air Force Research Laboratory on future munition concept demonstrators. Continue support and sustainment engineering of all previously existing items developed by the MMHE program office. Continue to provide MMHE Sustainment office at Robins AFB, GA, with engineering support. FY 2021 to FY 2022 Increase/Decrease Statement: FY2022 funding increased due to FY2021 MMHE funds utilization for higher priority bill and subsequent restoration to correct level in FY2022.					
Title: Medium Caliber Ammunition Description: The Medium Caliber Ammunition efforts support the warfighter's medium caliber ammunition research, development, test, and evaluation (RDT&E) requirements, DoN/USAF collaboration for the medium caliber family of ammunition, foreign comparative testing, inventory health challenges, procurement of ammunition, and other emerging technologies. FY 2021 Plans: Continue to provide engineering and technical support for PGU-48/B rounds as well as further comparative testing/EMD of alternative products/sources. Initiate development of the 30mm replacement round. Assess and mitigate Medium Caliber ammunition inventory health challenges. FY 2022 Base Plans: Continue to provide engineering and technical support for PGU-48/B rounds as well as further comparative testing/EMD of alternative products/sources. Initiate development of the 30mm replacement round. Assess and mitigate Medium Caliber ammunition inventory health challenges.	0.100	0.100	0.100	-	0.100
Title: Insensitive Munitions (IM) and Emerging Technology Description: Model and validate current munition performance; explore and develop IM and Energetics technology; assess, analyze, and evaluate emerging and developed technologies for future and existing weapon	1.666	2.200	0.300	-	0.300

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 0604602F / <i>Armament/Ordnance Development</i>	Project (Number/Name) 653133 / <i>Bombs & Fuzes</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
<p>and fuze capabilities to improve lethality, accuracy, and reliability in accordance with the National Defense Strategy roadmap.</p> <p>FY 2021 Plans: Provide modeling and engineering technical guidance and expertise for development of IM; assess, analyze, and evaluate developed technologies for future weapon capabilities.</p> <p>FY 2022 Base Plans: Provide modeling and engineering technical guidance and expertise for development of IM; assess, analyze, and evaluate emerging and developed technologies for future and existing weapon and fuze capabilities; support IM strategic planning.</p> <p>FY 2021 to FY 2022 Increase/Decrease Statement: Funding decreased due to higher Air Force priorities.</p>					
<p>Title: Cockpit-Selectable Height-Of-Burst Sensor (C-HOBS)</p> <p>Description: DSU-43/B Cockpit-selectable Height-Of-Burst Sensor (C-HOBS). The C-HOBS will be a replacement for the legacy DSU-33D/B proximity sensor. C-HOBS will replace the single factory height-of-burst setting with the addition of multiple height-of-burst options selectable via both manual switches and a cockpit interface. These selection options allow flexibility during flight to address a wide array of targets. The C-HOBS is intended to interface with the weapon via the cockpit and provide a cockpit-selectable proximity function for general and special purpose weapons (to include Next Generation Area Attack Weapons, NGAAWs).</p> <p>FY 2021 Plans: Complete design and qualification tests; and integration work. Conduct government/industry reviews working towards completion of Milestone C efforts. Start LRIP and First Article Acceptance Testing with a Full-Rate Production Decision. Pending Milestone Decision Authority approval of Full-Rate Production (FRP), will start FRP.</p> <p>FY 2022 Base Plans: Complete design and qualification tests; and integration work. Conduct government/industry reviews working towards completion of Milestone C efforts. Start Low Rate Initial Production and First Article Acceptance Testing with a Full-Rate Production Decision. Pending MDA approval of FRP, will start full-rate production.</p> <p>FY 2021 to FY 2022 Increase/Decrease Statement:</p>	3.210	14.995	2.886	-	2.886

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force			Date: May 2021		
Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 0604602F / <i>Armament/Ordnance Development</i>	Project (Number/Name) 653133 / <i>Bombs & Fuzes</i>			
B. Accomplishments/Planned Programs (\$ in Millions)					
	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
FY2022 funding decreased because C-HOBS Engineering Manufacturing and Design phase is coming to a close and transitioning to procurement.					
Title: Joint Air-to-Ground Missile for Fixed Wing (JAGM-F)					
Description: Joint Air-to-Ground Missile for Fixed Wing Aircraft (JAGM-F) is an improvement to the Army-led JAGM, which will allow the missile to be ejected from fixed wing aircraft in order to eliminate time sensitive moving targets and high value covered/sheltered targets. JAGM-F will be able to combat adverse weather/low visibility battlefield and countermeasure environments as well as austere communication environments. JAGM-F will have the ability to engage multiple targets types near-simultaneously in multiple engagement modes. Efforts include but are not limited to capability demonstration design, testing, and qualification, and manufacture/build components to production standards. Intent is to investigate meeting all BRU-55, BRU-70, and BRU-61 environments.					
FY 2021 Plans: N/A					
FY 2022 Base Plans: N/A					
FY 2021 to FY 2022 Increase/Decrease Statement: N/A					
	14.615	0.000	0.000	-	0.000
Title: Next Generation Area Attack Weapons (NGAAWs)					
Description: Next Generation Area Attack Weapons (NGAAWs) are a family of unitary area attack weapon capabilities to meet the DoD policy regarding cluster munitions and unintended harm to civilians. They consist of BLU-134/B and BLU-136/B warheads with a height of burst sensor. BLU-134/B Improved Lethality Warhead (ILW),NGAAW Increment I, is a near-term solution for area attack as an anti-personnel anti-materiel (APAM) weapon that improves lethality using a 500 lb warhead design and any variants. The BLU-136/B NGAAW Increment II continues development to provide significantly increased capability and lethality against area targets as an APAM weapon. This effort is being executed using an accelerated acquisition strategy to study, design, develop, and test a 2,000 lb unitary warhead design and any variants based on target sets.					
FY 2021 Plans:					
	0.163	0.060	0.000	-	0.000

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 0604602F / <i>Armament/Ordnance Development</i>	Project (Number/Name) 653133 / <i>Bombs & Fuzes</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
BLU-136/B is completing insensitive munitions testing in FY21 to include two slow cooks offs and two fast cook offs. FY 2022 Base Plans: N/A FY 2021 to FY 2022 Increase/Decrease Statement: Funding decreased because BLU-136/B's Engineering Manufacturing and Design phase is coming to a close and transitioning to procurement.					
Accomplishments/Planned Programs Subtotals	20.528	17.969	3.950	-	3.950

C. Other Program Funding Summary (\$ in Millions)											
<u>Line Item</u>	<u>FY 2020</u>	<u>FY 2021</u>	<u>FY 2022 Base</u>	<u>FY 2022 OCO</u>	<u>FY 2022 Total</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>FY 2026</u>	<u>Cost To Complete</u>	<u>Total Cost</u>
• PAAF 01 Line Item 353020: <i>General Purpose Bombs</i>	621.732	369.566	159.920	16.645	176.565	-	-	-	-	-	-
• PAAF 01 Line Item 356120: <i>Fuzes</i>	144.214	102.918	45.389	5.406	50.795	-	-	-	-	-	-
• PAAF 01 Line Item 352010: <i>Cartridges</i>	193.048	157.799	157.448	11.715	169.163	-	-	-	-	-	-

Remarks
N/A

D. Acquisition Strategy

- Fuzes (including C-HOBS) is a continuing effort with most activities performed through contracted services.
- Munitions Materiel Handling Equipment (MMHE) project activities are performed in-house with limited technical and analysis contract support.
- Medium Caliber Ammunition project activities are performed in-house with technical and analysis contract support, organic government test support, and possible contracted services (small contracts).
- Insensitive Munitions project activities are performed in-house with limited technical and analysis contract support

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 0604602F / <i>Armament/Ordnance Development</i>	Project (Number/Name) 653133 / <i>Bombs & Fuzes</i>
<p>-Emerging Technologies are innovative efforts with most activities performed through various contracted services such as OTA's and DOTC; a limited number of activities such as technical analysis and test are performed by organic resources and support contractors.</p> <p>- Joint Air-to-Ground Missile for Fixed Wing Aircraft (JAGM-F) utilizes the Defense Ordnance Technology Consortium (DOTC) contract combined with modeling and simulation contract support and government test support.</p>		

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 0604602F / Armament/Ordnance Development	Project (Number/Name) 653133 / Bombs & Fuzes
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Product Development (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
IM and Emerging Technology	Various	Various : TBD	-	0.300	Mar 2020	2.200	Mar 2021	0.200	Mar 2022	-		0.200	-	-	-
MMHE - Prototypes	Various	Prototype Fabrication Shop : Eglin AFB, FL	-	0.194	Apr 2020	0.443	Apr 2021	0.527	Jan 2022	-		0.527	-	-	-
CHOBS - HW/SW	C/Various	Various : Eglin AFB, FL	-	1.149	Jan 2020	6.302	Oct 2020	0.560	Oct 2021	-		0.560	-	-	-
JAGM-F	C/FFP	DOTC : Huntsville, AL	-	10.968	Mar 2020	-		-		-		-	-	-	-
Subtotal			-	12.611		8.945		1.287		-		1.287	-	-	N/A

Support (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
MMHE - Shipping/Supplies	Various	MMHE Program Office : Eglin AFB, FL	-	0.130	Mar 2020	0.100	Mar 2021	0.010	Nov 2021	-		0.010	-	-	-
JAGM-F - Test Vehicles	Various	Army : Huntsville, AL	-	0.000	Jun 2020	-		-		-		-	-	-	-
Subtotal			-	0.130		0.100		0.010		-		0.010	-	-	N/A

Test and Evaluation (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
IM and Emerging Technology	Various	Various : Various	-	1.366	Jun 2020	-		-		-		-	-	-	6.530
CHOBS - Test and Evaluation	C/Various	Various : Various	-	1.855	Aug 2020	8.058	Oct 2020	2.026	Oct 2021	-		2.026	-	-	-
MMHE - Test Support	PO	96 TW : Eglin AFB, FL	-	0.050	Nov 2019	0.050	Nov 2020	0.010	Nov 2021	-		0.010	-	-	-

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 0604602F / Armament/Ordnance Development	Project (Number/Name) 653133 / Bombs & Fuzes
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Test and Evaluation (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
NGAAW- Test and Evaluation	PO	96 TW : Eglin AFB, FL	-	0.163	Jul 2020	0.060	Nov 2020	-		-		-	-	-	-
JAGM-F - Test Support	Various	Various : Various	-	2.894	Oct 2020	-		-		-		-	-	-	-
Subtotal			-	6.328		8.168		2.036		-		2.036	-	-	N/A

Management Services (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
IM and Emerging Technology- PMA	Various	Not specified. : TBD	-	-		-		0.100	Dec 2021	-		0.100	-	-	-
Medium Caliber - PMA	Various	Various : Eglin AFB, FL	-	0.100	Jun 2020	0.100	Jun 2021	0.100	Jun 2022	-		0.100	-	-	-
MMHE - PMA	Various	Various : Eglin AFB, FL	-	0.400	Jun 2020	0.021	Jun 2021	0.117	Mar 2022	-		0.117	-	-	-
CHOBS - PMA	Various	Various : Eglin AFB, FL	-	0.206	Oct 2019	0.635	Oct 2020	0.300	Oct 2021	-		0.300	-	-	-
JAGM-F - PMA	Various	Various : Eglin AFB, FL	-	0.753	Aug 2020	-		-		-		-	-	-	-
Subtotal			-	1.459		0.756		0.617		-		0.617	-	-	N/A

	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract		
	Project Cost Totals		-	20.528	17.969	3.950	-	-	3.950	-	-

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 0604602F / <i>Armament/Ordnance Development</i>	Project (Number/Name) 653133 / <i>Bombs & Fuzes</i>

	FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

<i>Bombs and Fuzes</i>	
MMHE: design, prototype, test priority efforts	[REDACTED]
IM and Emerging Technologies	[REDACTED]
BLU-136/B: Warhead design/initial prototype	[REDACTED]
C-HOBS: RFP/Source selection	[REDACTED]
C-HOBS: Contract Award	[REDACTED]
C-HOBS: Design, build, test, and integrate	[REDACTED]
JAGM-F: Contract Award	[REDACTED]
JAGM-F: Conduct Demonstration	[REDACTED]
Medium Caliber Ammunition: Assess, refine, and develop	[REDACTED]

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Exhibit R-4A, RDT&E Schedule Details: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 0604602F / <i>Armament/Ordnance Development</i>	Project (Number/Name) 653133 / <i>Bombs & Fuzes</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>Bombs and Fuzes</i>				
MMHE: design, prototype, test priority efforts	1	2020	4	2026
IM and Emerging Technologies	1	2020	4	2026
BLU-136/B: Warhead design/initial prototype	1	2020	4	2021
C-HOBS: RFP/Source selection	1	2020	2	2021
C-HOBS: Contract Award	2	2020	2	2021
C-HOBS: Design, build, test, and integrate	2	2020	4	2022
JAGM-F: Contract Award	2	2020	3	2020
JAGM-F: Conduct Demonstration	3	2020	4	2020
Medium Caliber Ammunition: Assess, refine, and develop	1	2020	4	2026

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 0604602F / Armament/Ordnance Development	Project (Number/Name) 655361 / Stores-Aircraft Interface
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COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
655361: Stores-Aircraft Interface	-	8.977	5.065	5.097	0.000	5.097	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

655361: The Stores-Aircraft Interface conducts stores-aircraft interface upgrades and standards development to include the Universal Armament Interface (UAI). UAI is an Air Force initiative to develop standardized software interfaces in aircraft weapons and mission planning. The savings realized from this effort is on average 6 years of schedule and \$22M per aircraft/weapon combination. This is accomplished integrating weapons independent of aircraft Operational Flight Programs (OFP) cycles. UAI is currently implemented on the F-15E, F-16 Block 40/50 and European Participating Air Forces (EPAF) F-16 aircraft, Small Diameter Bomb (SDB) I and II, Joint Direct Attack Munition (JDAM), Laser JDAM, Joint Air-to-Surface Stand-off Missile (JASSM), Joint Mission Planning System (JMPS) and Precision Guided Munitions Planning Software (PGMPS). Planned implementations include Joint Strike Fighter (JSF/F-35), B-21, MQ-9, JASSM-Extended Range (JASSM-ER), F/A-18, Advanced Anti-Radiation Guided Missile - Extended Range (AARGM-ER), Stand-in Attack Weapon (SiAW), Long Range Anti-Ship Missile (LRASM), AC-130J, Golden Horde, Combat Weapons Delivery Software (CWDS), Select Precision Effects At Range Capability 3 (SPEAR3), Joint Strike Missile (JSM), and Navy Open Mission Systems (NOMS). The UAI program office is responsible for development and enhancement of the UAI standard, support to coalition/allied/joint interoperability efforts for weapons-platform interface, provision of certification tools, and implementation support to aircraft and weapons.

B. Accomplishments/Planned Programs (\$ in Millions)

	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Title: Universal Armament Interface (UAI) Development	8.977	5.065	5.097	-	5.097
Description: Continue development and maintenance of the Air Force's mandated aircraft/weapon interface, to include UAI Mission Planning and Launch Acceptability Region (LAR) components.					
FY 2021 Plans: Development and configuration management of UAI in response to evolving requirements to include expanding capability to support air-to-air weapon integration. Ongoing air-to-ground integration support includes all USAF weapons, aircraft including USN and US Army customers. Support working groups, technical meetings and workshops, risk reduction assessments, common mission planning, and platform-specific implementation of UAI. Maintain and logistically support existing certification tools to meet current and future user system integration lab test certification needs. These tools are shared among aircraft and weapons programs to reduce time and cost for UAI integration efforts. Support multinational Memorandum of Understanding including but not limited to Joint Strike Missile (JSM), Select Precision Effects At Range Capability 3(SPEAR3), and Stand Off Missile - Joint (SOM-J).					
FY 2022 Base Plans:					

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 0604602F / <i>Armament/Ordnance Development</i>	Project (Number/Name) 655361 / <i>Stores-Aircraft Interface</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Continue development and configuration management of UAI in response to evolving requirements including ongoing transition of mission planning to Navy Open Mission Systems (NOMS); inclusion of expanded capability to support air-to-air weapon integration will require additional funding. Ongoing air-to-ground integration support includes all USAF weapons and aircraft, and includes USN and US Army customers. Support working groups, technical meetings and workshops, risk reduction assessments, common mission planning, and platform-specific implementation of UAI. Maintain and logistically support existing certification tools (within program budgetary limits) to meet current and future user system integration lab test certification needs. These tools are shared among aircraft and weapons programs to reduce time and cost for UAI integration efforts. Support international efforts including but not limited to Joint Strike Missile (JSM), SPEAR3, Stand Off Missile - Joint (SOM-J), and develop/implement a multinational Memorandum of Understanding.					
<i>FY 2021 to FY 2022 Increase/Decrease Statement:</i> Funding increase is minimal and due to inflation.					
Accomplishments/Planned Programs Subtotals	8.977	5.065	5.097	-	5.097

C. Other Program Funding Summary (\$ in Millions)
N/A

Remarks
N/A

D. Acquisition Strategy
In December 2004, under the authority of a class Justification and Approval (J&A), the UAI program office awarded individual Cost Plus Fixed Fee (CPFF) contracts to Boeing, Lockheed Martin, Northrop Grumman, and Raytheon. Each Original Equipment Manufacturer is responsible for a different piece of the total UAI requirement based on its product-specific (platform/weapon) expertise. During FY10, the original contracts expired. Under the authority of a class J&A, Cost Plus Incentive Fee (CPIF) contracts were awarded to the four UAI vendors in August 2010. Follow-on period of performance was awarded in March 2014 for 16 months to better align future contract awards with funding through the Future Years Defense Program. The period of performance was extended to 1 November 2015 to allow immediate start of the effort on F-35/JSF request for changes. A new J&A was approved in January 2015 for the follow-on sole-source contracts to the original equipment manufacturers (OEMs). These new sole-source contracts were awarded in November 2015 and expired in November 2019. A new J&A was signed in December 2018, prior to contract expiration, and four new five-year sole-source contracts (CPFF) were awarded in November 2019.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 0604602F / Armament/Ordnance Development	Project (Number/Name) 655361 / Stores-Aircraft Interface
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Product Development (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Interface Control Document (ICD) Development/Updates/Maintenance	SS/ Various	Boeing Northrop Grumman Lockheed Martin Raytheon : Various	-	8.787	Nov 2019	4.861	Nov 2020	4.891	Nov 2021	-		4.891	-	-	-
Subtotal			-	8.787		4.861		4.891		-		4.891	-	-	N/A

Remarks
New 5 year Follow-on contract was awarded in November 2019.

Management Services (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
A&AS Contractor Support	Various	Various : Various	-	0.140	Oct 2019	0.144	Dec 2020	0.146	Jun 2022	-		0.146	-	-	-
Program Office Travel	C/CPAF	Not specified. : TBD	-	0.050		0.060		0.060		-		0.060	-	-	-
Subtotal			-	0.190		0.204		0.206		-		0.206	-	-	N/A

Remarks
PE Systems Contractor provides support to the Program Office for financial services.

Project Cost Totals	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
	-	8.977	5.065	5.097	-	5.097	-	-	N/A

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 0604602F / <i>Armament/Ordnance Development</i>	Project (Number/Name) 655361 / <i>Stores-Aircraft Interface</i>

FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

Stores-Aircraft Interface	
Governance (Super Joint Interface Control Working Group)	
Certification Tools (CTs) Dev / Update	
UAI (Mission Planning) Common Component	
Weapon Sustainment/Regression Efforts: JDAM, JASSM-ER, SDB I+II	
A/C Sustainment/Regression Efforts: F-16 Blk 40/50, F-15E	
Weapon Dev: SiAW, JSM, SPEAR3, LRASM, AARGM-ER, JAGM-F, Golden Horde	
A/C Dev: F-16 Foreign Military Sales, F-35, B-21, B-1, A-10, F-22, F-18, MQ-9, F-15EX, MQ-IC, AC-130J	

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Exhibit R-4A, RDT&E Schedule Details: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 0604602F / <i>Armament/Ordnance Development</i>	Project (Number/Name) 655361 / <i>Stores-Aircraft Interface</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
Stores-Aircraft Interface				
Governance (Super Joint Interface Control Working Group)	1	2020	4	2026
Certification Tools (CTs) Dev / Update	1	2020	4	2026
UAI (Mission Planning) Common Component	1	2020	4	2026
Weapon Sustainment/Regression Efforts: JDAM, JASSM-ER, SDB I+II	1	2020	4	2026
A/C Sustainment/Regression Efforts: F-16 Blk 40/50, F-15E	1	2020	4	2026
Weapon Dev: SiAW, JSM, SPEAR3, LRASM, AARGM-ER, JAGM-F, Golden Horde	1	2020	4	2026
A/C Dev: F-16 Foreign Military Sales, F-35, B-21, B-1, A-10, F-22, F-18, MQ-9, F-15EX, MQ-IC, AC-130J	1	2020	4	2026

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 0604604F / <i>Submunitions</i>
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COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
Total Program Element	-	3.043	3.085	2.954	0.000	2.954	-	-	-	-	-	-
653166: <i>Joint Smart Munitions Test and Evaluation</i>	-	3.043	3.085	2.954	0.000	2.954	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-	-	-

A. Mission Description and Budget Item Justification

Project Chicken Little (PCL) continues providing superior rapid reaction signature exploitation capabilities for use on both the traditional and the asymmetrical battlefield. PCL delivers vital one-of-a-kind research, development, test, and evaluation (RDT&E) expertise directly to the warfighter, capability developer, and allied/coalition forces.

From its inception in 1985, PCL constantly advances the state-of-the-art for developmental smart munitions, seekers/sensors, and their platforms. PCL also focuses its capability against today's networked weapons, emerging weapon concepts, and helps develop innovative targeting technologies to be employed against a wide variety of vehicle targets, theater air defense units, and an extensive array of associated equipment.

Combat systems and support equipment exhibit physical characteristics (i.e. signatures) and present certain vulnerabilities, which can be exploited by various targeting technologies leading to the elimination or incapacitation of the threat through the application of force (e.g. smart munitions or directed energy) or application of intelligence, surveillance, reconnaissance (ISR) methods. PCL collects physical, functional, and signature attributes of real foreign threat systems and related equipment; these data feed high-fidelity models used to predict detection, classification, vulnerability, and effectiveness performance for ISR sensor and weapon system design. PCL collects high resolution signature data using a variety of ground, air, and space-based sensors against both new and existing (obtained, sustained, and maintained to be signature representative) foreign targets; with and without the presence of camouflage, concealment, and deception materials; and operated using enemy tactics/Concept of Operations (CONOPS). The resulting highly reliable, realistic data directly support munitions/targeting development programs and helps mitigate overall acquisition risk. PCL serves as a major focal point for joint signature exploitation, collection, and dissemination within the DoD. PCL is a prime contributor in the time critical process to rapidly exploit, assess, and determine US and allied weapon/targeting performance against high value targets. Customers include: the major Defense and Service Intelligence Centers, all Services, the Joint Technical Coordinating Group (JTTCG) who develop the Joint Munitions Effectiveness Manuals (JMEMs), Combatant Commands, AF Major Commands, US Air Force Weapons School curriculum support, and others. Current projects include, but are not limited to: target signature exploitation, target geometric modeling (for identifying vulnerabilities), improving air capabilities against protected structures (specifically hard and deeply buried targets), and the testing of multiple seekers, sensors, and targeting technologies in representative environments against Combatant Command/Major Command/Intelligence Community high value targets.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver Chicken Little capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program element 0605831F.

The FY2022 funding request was reduced by \$0.157 million to account for the availability of prior year execution balances.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force	Date: May 2021
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Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 0604604F / <i>Submunitions</i>
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This program is in Budget Activity 5, System Development and Demonstration (SDD) because it has passed Milestone B approval and is conducting engineering and manufacturing development tasks aimed at meeting validated requirements prior to full rate production.

B. Program Change Summary (\$ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Previous President's Budget	3.045	3.091	3.155	0.000	3.155
Current President's Budget	3.043	3.085	2.954	0.000	2.954
Total Adjustments	-0.002	-0.006	-0.201	0.000	-0.201
• Congressional General Reductions	0.000	-0.006			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	-0.002	0.000			
• Other Adjustments	0.000	0.000	-0.201	0.000	-0.201

Change Summary Explanation

No Significant Changes

C. Accomplishments/Planned Programs (\$ in Millions)	FY 2020	FY 2021	FY 2022
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Title: Project Chicken Little (PCL)	3.043	3.085	2.954
Description: Provide the DoD community accurate multi-spectral signatures obtained from high-value, signature representative modern threat systems using advanced collection technologies.			
Exploitations typically occur CONUS; however, PCL is postured to support OCONUS collections as dictated by mission requirements.			
A critical underpinning of the System Exploitation major thrust area, Sensor Week, occurs every two years and provides a unique air and ground demonstration/validation of candidate Seeker/Sensor/Intelligence, Surveillance, and Reconnaissance (ISR) technologies.			
Plan and conduct captive carry flight tests and signature collection for seeker/sensor technology evaluations.			

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force		Date: May 2021		
Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 5: System Development & Demonstration (SDD)</i>		R-1 Program Element (Number/Name) PE 0604604F / <i>Submunitions</i>		
C. Accomplishments/Planned Programs (\$ in Millions)		FY 2020	FY 2021	FY 2022
<p>Develop, validate, and accredit improved models for target vulnerability and weapons effectiveness in support of Combatant Commands' (COCOMs) requirements.</p> <p>FY 2021 Plans: Exploit high value threat systems (typically 4 per year). Provide signature data from multiple threat systems in various environments using advanced and developmental seeker/sensor technologies.</p> <p>Conduct Sensor Week (SW), providing a singularly unique forum for joint service demonstration of developmental and operational seekers/sensors/ISR assets against a wide array of US, coalition, and foreign national ground targets.</p> <p>Exploit the signatures of ISR targets; conduct rapid reaction performance analysis & evaluations in support of COCOM/MAJCOM immediate/urgent warfighter needs; optimize current project methods to support ISR testing; capture and catalog multi-spectral signatures on asymmetric threat Unmanned Aerial Systems (UAS).</p> <p>Assist in obtaining relevant, high value, and emergent threat assets and/or decoys. Ensure the fleet foreign threat assets remain properly "signature representative" for systems development and testing.</p> <p>Develop, validate, and accredit improved computer vulnerability and weapons effectiveness in support of warfighter requirements.</p> <p>FY 2022 Plans: Exploit high value threat systems (typically 4 per year). Provide signature data from multiple threat systems in various environments using advanced and developmental seeker/sensor technologies.</p> <p>Conduct Sensor Week (SW), providing a singularly unique forum for joint service demonstration of developmental and operational seekers/sensors/ISR assets against a wide array of US, coalition, and foreign national ground targets.</p> <p>Exploit the signatures of ISR targets; conduct rapid reaction performance analysis & evaluations in support of COCOM/MAJCOM immediate/urgent warfighter needs; optimize current project methods to support ISR testing; capture and catalog multi-spectral signatures on asymmetric threat Unmanned Aerial Systems (UAS).</p>				

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force	Date: May 2021
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Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 0604604F / <i>Submunitions</i>
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C. Accomplishments/Planned Programs (\$ in Millions)	FY 2020	FY 2021	FY 2022
Assist in obtaining relevant, high value, and emergent threat assets and/or decoys. Ensure the fleet foreign threat assets remain properly "signature representative" for systems development and testing.			
Develop, validate, and accredit improved computer models to determine target vulnerability and weapons effectiveness in support of warfighter requirements.			
<i>FY 2021 to FY 2022 Increase/Decrease Statement:</i> Funding decreased due to inflation fluctuation and underexecution due to an active hurricane season in FY20.			
Accomplishments/Planned Programs Subtotals	3.043	3.085	2.954

D. Other Program Funding Summary (\$ in Millions)

N/A

Remarks

E. Acquisition Strategy

Funds are executed organically in support of test and evaluation activities including studies, analyses, flight & ground tests, model building and simulation. Work is performed in-house by the 96th Test Wing.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 0604604F / <i>Submunitions</i>	Project (Number/Name) 653166 / <i>Joint Smart Munitions Test and Evaluation</i>
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Support (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Maintain Test Asset Relevancy	PO	Various : Las Vegas, NV	-	0.800	Nov 2019	0.800	Nov 2020	0.800	Nov 2021	-		0.800	-	-	0.800
Subtotal			-	0.800		0.800		0.800		-		0.800	-	-	N/A

Remarks
Fleet relevance addresses the acquisition of new and emerging threat vehicles, acquisition of high fidelity decoys, and sustainment of fleet signature quality.

Test and Evaluation (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Conduct Test and Analysis	MIPR	96th Test Wing : Eglin AFB, FL	-	2.188	Nov 2019	2.230	Nov 2020	2.109	Nov 2021	-		2.109	-	-	-
Subtotal			-	2.188		2.230		2.109		-		2.109	-	-	N/A

Remarks
96th Test Wing (96 CTG, 46 TS) is the Program Office which conducts inhouse testing.

Management Services (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Management Services	MIPR	46TS/TGBB : Eglin, FL	-	0.055	Nov 2019	0.055	Nov 2020	0.045	Nov 2021	-		0.045	-	-	-
Subtotal			-	0.055		0.055		0.045		-		0.045	-	-	N/A

Remarks
96th Test Wing (96 CTG, 46 TS) is the Program Office which conducts in house testing.

	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract	
Project Cost Totals		-	3.043	3.085	2.954	-	2.954	-	-	N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Air Force							Date: May 2021			
Appropriation/Budget Activity 3600 / 5			R-1 Program Element (Number/Name) PE 0604604F / <i>Submunitions</i>			Project (Number/Name) 653166 / <i>Joint Smart Munitions Test and Evaluation</i>				
	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract	

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 0604604F / <i>Submunitions</i>	Project (Number/Name) 653166 / <i>Joint Smart Munitions Test and Evaluation</i>

FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

<i>Project Chicken Little; JMT&E</i>	
Target/warhead evaluation/analysis, signature test, captive carry flight tests.	
FY20 Sensor Week	
FY22 Sensor Week	
FY24 Sensor Week	
FY26 Sensor Week	

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Exhibit R-4A, RDT&E Schedule Details: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 0604604F / <i>Submunitions</i>	Project (Number/Name) 653166 / <i>Joint Smart Munitions Test and Evaluation</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>Project Chicken Little; JMT&E</i>				
Target/warhead evaluation/analysis, signature test, captive carry flight tests.	1	2020	4	2026
FY20 Sensor Week	3	2020	3	2021
FY22 Sensor Week	3	2022	3	2023
FY24 Sensor Week	3	2024	3	2025
FY26 Sensor Week	3	2026	4	2026

Note

FY26 Sensor Week is planned to occur 3QFY26-3QFY27.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 0604617F / <i>Agile Combat Support</i>
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COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
Total Program Element	-	31.133	18.980	16.603	0.000	16.603	-	-	-	-	-	-
652895: <i>Civil Engineering Readiness</i>	-	24.347	17.326	14.938	0.000	14.938	-	-	-	-	-	-
654910: <i>Aeromedical Readiness</i>	-	6.786	1.654	1.665	0.000	1.665	-	-	-	-	-	-

A. Mission Description and Budget Item Justification

This program provides lighter, leaner, rapidly-deployable and technologically-advanced materiel, forces and capabilities to the warfighter. Current projects in this program include Civil Engineering Readiness (Project 652895) and Aeromedical Readiness (Project 654910). Civil Engineering Readiness projects enable airfield protection, and airfield damage recovery for sustainment, and increased resiliency of airfield operations anywhere in the world. Aeromedical Readiness projects provide aerospace medical systems and treatment equipment to improve casualty care and meet worldwide warfighter medical operational requirements.

This program element may include necessary emergent or unanticipated civilian pay expenses required to manage, execute, and deliver Civil Engineering and Aeromedical Readiness for emergent or unanticipated weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program element 0605831F.

This program is in Budget Activity 5, System Development and Demonstration (SDD) because it has passed Milestone B approval and is conducting engineering and manufacturing development tasks aimed at meeting validated requirements prior to full rate production.

B. Program Change Summary (\$ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Previous President's Budget	26.944	20.609	18.006	0.000	18.006
Current President's Budget	31.133	18.980	16.603	0.000	16.603
Total Adjustments	4.189	-1.629	-1.403	0.000	-1.403
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	-1.594			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	5.060	0.000			
• SBIR/STTR Transfer	-0.871	0.000			
• Other Adjustments	0.000	-0.035	-1.403	0.000	-1.403

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 0604617F / <i>Agile Combat Support</i>
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Congressional Add Details (\$ in Millions, and Includes General Reductions)

Project: 652895: *Civil Engineering Readiness*

Congressional Add: *Multi-Modal Threat Detection and Mitigation*

Congressional Add Subtotals for Project: 652895

Congressional Add Totals for all Projects

FY 2020	FY 2021
6.032	0.000
6.032	0.000
6.032	0.000

Change Summary Explanation

FY 20 Increase of \$7M for Congressional Add for Multi-modal threat detection and mitigation; along with reductions for Small Business Innovative Research (SBIR). Originally aligned to wrong BPAC

FY21 Decreases of \$-1.594M for technology transfer delays

FY22 No significant changes

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 5					R-1 Program Element (Number/Name) PE 0604617F / Agile Combat Support				Project (Number/Name) 652895 / Civil Engineering Readiness			
COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
652895: <i>Civil Engineering Readiness</i>	-	24.347	17.326	14.938	0.000	14.938	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note
 FY21 funding: Due to a database error, FY21 Congressional mark applied to this BPAC 652895 vice BPAC 654910 Aeromedical. BPAC 652895 CE should equal \$18.920M

A. Mission Description and Budget Item Justification

This Civil Engineering (CE) Readiness project develops Airbase Technologies (ABT), Airfield Damage Repair (ADR), Airfield Protection (AP), Energy & Utilities (E&U), and CE Materials (CEM) solutions for in-garrison, expeditionary, and contingency installations and airbases. This includes: technologies for airfield assessment, pavement repair and unexploded ordnance identification and mitigation to enable rapid recovery and regeneration of airfield operations; infrastructure design criteria, construction methods, hardened shelters, evaluation tools, materials, aviation firefighting, force protection, expeditionary energy, waste water recycling/treatment, CE materials applications and systems for improved resiliency and rapid recovery of airbase and airfield operations following an attack.

B. Accomplishments/Planned Programs (\$ in Millions)

	FY 2020	FY 2021	FY 2022
Title: Airbase Technologies	1.698	3.009	3.259
Description: Technical support providing RDT&E capabilities for cross-cutting CE applications and processes for all CE functional areas. Provides replacements and repair of critical RDT&E lab equipment, test systems and instruments. Specialized RDT&E systems and software required to conduct CE RDT&E.			
FY 2021 Plans: Continue development and testing material technologies for indigenous soil-based cements and bio-cementation for expeditionary ADR, test and evaluation of aviation asphalt aging mitigation technologies for reduced life cycle costs, development and testing of additive manufacturing approaches for CE applications, development of functionalized materials for hardened infrastructure and force protection applications, evaluation of disposal and mitigation technologies for AFFF and evaluation of expeditionary energy storage systems for incorporation of renewable energy systems with USAF BEAR equipment. Replace/repair critical RDT&E lab equipment. Fund program management support, RDT&E IT systems and software required to conduct CE RDT&E.			
FY 2022 Plans: Continue development and testing material technologies for indigenous soil-based cements and bio-cementation for expeditionary ADR, test and evaluation of aviation asphalt aging mitigation technologies for reduced life cycle costs, development and testing of additive manufacturing approaches for CE applications, development of functionalized materials for hardened infrastructure and force protection applications, evaluation of disposal and mitigation technologies for AFFF and evaluation of expeditionary energy			

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force		Date: May 2021		
Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 0604617F / Agile Combat Support	Project (Number/Name) 652895 / Civil Engineering Readiness		
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2020	FY 2021	FY 2022
storage systems for incorporation of renewable energy systems with USAF BEAR equipment. Replace/repair critical RDT&E lab equipment. Fund program management support, RDT&E IT systems and software required to conduct CE RDT&E.				
FY 2021 to FY 2022 Increase/Decrease Statement: Planned increase				
Title: Airfield Damage Repair		10.666	8.714	7.629
Description: This effort develops, tests, and certifies equipment, materials, and Tactics, Techniques, and Procedures (TTPs) for the rapid assessment and repair of airfield damage, which includes identification, mitigation or removal of unexploded ordnance and expedient repairs for fuel and utility systems. This effort will also accelerate the transition of proven technologies in expedient and sustained protection of critical infrastructure, including operating surfaces, shelters, fuel storage and distribution systems, and command and control (C2) systems. Further, this effort focuses on the resiliency of airbase infrastructure as well as the timely repair and regeneration of airfield operations within established time limits in order to gain and maintain air superiority.				
FY 2021 Plans: Mature and transition the rapid assessment, mitigation, and repair tool and material solutions for airfield damage recovery through research, development, testing, and evaluation. Rapid assessment includes spiral development of integration of small unmanned aerial systems (SUAS), sensors, and automated damage detection software solutions to significantly decrease damage assessment time and improve automated detection of unexploded ordnance (UXO). Mitigation includes testing and evaluation of automated systems to remotely remove and neutralize UXO through a family of Rapid Explosive Hazard Mitigation (REHM) components. This family of systems will include manned and unmanned systems with improved blast resistance capability to fit on both new and existing systems. Repair of damage focuses on development, testing, and transition of materials and equipment sets for rapid recovery of enemy induced battle damaged runways. New materials will have minimal dependence on shipping and logistics, with importance being placed on materials available on hand at any location, while new systems will focus heavily on testing and operation in extreme weather conditions.				
FY 2022 Plans: Mature and transition the rapid assessment, mitigation, and repair tool and material solutions for airfield damage recovery through research, development, testing, and evaluation. Rapid assessment includes spiral development and integration of small unmanned aerial systems (SUAS), mobile towers, and handheld platforms to utilize various sensors, to provide data for automated damage detection software solutions to significantly decrease damage assessment time and improve automated detection of unexploded ordnance (UXO). Mitigation includes development, testing and evaluation of systems to remotely remove and neutralize UXO through a family of Rapid Explosive Hazard Mitigation (REHM) components. This family of systems will include manned and unmanned systems with improved blast resistance capability to fit on both new and existing systems. Repair of damage focuses on development, testing, and transition of materials and equipment sets for rapid recovery of enemy induced battle damaged runways. New materials will have minimal dependence on shipping and logistics, with new techniques and				

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force		Date: May 2021		
Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 0604617F / Agile Combat Support	Project (Number/Name) 652895 / Civil Engineering Readiness		
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2020	FY 2021	FY 2022
<p>procedures to place locally sourced materials to provide equal or greater strength to current ADR equipment. New systems will be developed and tested to provide similar or greater repair speeds with smaller logistic requirement, and current equipment test and evaluation will focus heavily on testing and operation in extreme weather conditions.</p> <p>FY 2021 to FY 2022 Increase/Decrease Statement: Across the board budget cut due to AF cost increases.</p>				
<p>Title: Expeditionary Airfield Damage Repair (EADR) JCTD</p> <p>Description: The purpose of the EADR JCTD is to develop and transition the capability to rapidly and repeatedly repair damaged airfield surfaces operating under the dynamic basing concept of operations (CONOP). The goal is to develop and transition technologies that minimize airfield downtime and maximize combat sortie generation. The JCTD will execute a spiral development-oriented program that will transition mature technologies throughout the life of the program.</p> <p>FY 2021 Plans: Down-select final capability solution set to meet operational requirement. Conduct final Operational User Assessment exercises to demonstrate final total capability for prototype solution. Publish predictive methodology to estimate site-specific repair requirements and tactics, techniques, and procedures (TTP) necessary for capability operation across services. Begin transition and acquisition of solutions to meet requirements for expedient and expeditionary airfield damage repair (EADR).</p> <p>FY 2022 Plans: None project complete in FY21</p> <p>FY 2021 to FY 2022 Increase/Decrease Statement: Project ended in FY21</p>		2.751	2.000	0.000
<p>Title: Airfield Protection</p> <p>Description: Research, develop and transition technologies for hardening and protecting airfield infrastructure from munitions attack, unexploded ordnance and aircraft, equipment and infrastructure fires. Included within this effort are structural solutions, expeditionary and expedient hardening and protection solutions, explosive ordnance disposal technologies and aviation firefighting technologies. The technologies developed from this effort provide improved resiliency and rapid restoration of airbase and airfield operations following an attack.</p> <p>FY 2021 Plans: Continue RDT&E of new concepts for protection materials for lighter, less expensive solutions for infrastructure hardening. Test and evaluate technologies against penetrating munitions including cruise missile hardening and improve expedient sheltering to address advanced threats. Continue development and begin testing of selective hardening systems for infrastructure. Continue testing and evaluation of unconventional countermeasures technology for transition. Continue research and development</p>		2.800	2.603	3.050

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force	Date: May 2021
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Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 0604617F / Agile Combat Support	Project (Number/Name) 652895 / Civil Engineering Readiness
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B. Accomplishments/Planned Programs (\$ in Millions)	FY 2020	FY 2021	FY 2022
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<p>of aviation firefighting technologies for treatment and replacement of the perfluorinated aqueous film forming foams (AFFF), clean firefighting agents - Halon replacement and aviation firefighting equipment. Continue RDT&E of EOD technologies for neutralization of sub-munition and UXO threats.</p> <p>FY 2022 Plans: Upgrade/modernize existing personnel protective bunkers and Air Force infrastructure hardening standards to meet current threat(s). Continue RDT&E of new concepts for protection materials for lighter, less expensive solutions for infrastructure hardening. Test and evaluate technologies against penetrating munitions including cruise missile hardening and improve expedient sheltering to address advanced threats. Continue testing of selective hardening systems for infrastructure. Continue testing and evaluation of unconventional countermeasures technology for transition. Continue research and development of aviation firefighting technologies for treatment and replacement of the perfluorinated aqueous film forming foams (AFFF), clean firefighting agents - Halon replacement and aviation firefighting equipment. Continue RDT&E of EOD technologies for neutralization UXO threats for transition into service.</p> <p>FY 2021 to FY 2022 Increase/Decrease Statement: Planned increase for AFFF replacement testing & evaluation and advanced shelters.</p>			
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Title: Energy & Utilities	0.400	1.000	1.000
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<p>Description: Research, develop and transition technologies for energy and utilities resiliency for BEAR base and airbase infrastructure. The focus of this effort is for energy and utilities technologies that provide increased efficiency and decreased logistic costs for expeditionary and in-garrison applications. This includes: expeditionary shelters, environmental conditioning systems, water and waste stream processing, power production and power management systems.</p> <p>FY 2021 Plans: Continue development of the METER site at Tyndall AFB. . Conduct bench and lab scale testing of new energy and utilities technologies at the METER site prior to scaling up to full scale test and evaluation at the BTEIL site. Test and evaluate expeditionary energy and shelter technologies that incorporate resiliency and sustainability for USAF expeditionary assets. Field demonstration of innovative expeditionary water and waste systems in an operational environment prior to fielding. Support test and evaluation of commercial technologies/systems that includes: expeditionary shelters, environmental conditioning systems, energy storage, power generation and management system, water and waste stream processing system. These system will provide war-fighter with improve energy resiliency and efficiency while and reducing logistics for expeditionary and fixed base operations.</p> <p>FY 2022 Plans: Complete development of the METER site at Tyndall AFB. Continue bench and lab scale testing of new energy and utilities technologies at the METER site prior to scaling up to full scale test and evaluation at the BTEIL site. Continue test and evaluation of expeditionary energy storage and shelter technologies that incorporate resiliency and sustainability capabilities for USAF</p>			
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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 0604617F / Agile Combat Support	Project (Number/Name) 652895 / Civil Engineering Readiness
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B. Accomplishments/Planned Programs (\$ in Millions)	FY 2020	FY 2021	FY 2022
expeditionary assets. Conduct field demonstration of innovative expeditionary water and waste disposal systems in an operational environment prior to fielding. Support test and evaluation of commercial technologies/systems that includes: expeditionary shelters, environmental conditioning systems, hybrid renewable energy systems, energy storage, power generation and management system, water and waste stream processing system. These system will provide warfighter with improve energy resiliency and efficiency while and reducing logistics for expeditionary and fixed base operations.			
Accomplishments/Planned Programs Subtotals	18.315	17.326	14.938

	FY 2020	FY 2021
Congressional Add: Multi-Modal Threat Detection and Mitigation	6.032	0.000
FY 2020 Accomplishments: Create a force multiplier for USAF wide-area Force Protection by coupling fielded sensor technologies and countermeasures with Artificial Intelligence (AI)/Machine Learning (ML). Enhance the effectiveness of USAF defense personnel with AI/ML systems to detect and classify targets, determine intent, and deploy countermeasures		
FY 2021 Plans: Contract planning		
Congressional Adds Subtotals	6.032	0.000

C. Other Program Funding Summary (\$ in Millions)

<u>Line Item</u>	<u>FY 2020</u>	<u>FY 2021</u>	<u>FY 2022</u> <u>Base</u>	<u>FY 2022</u> <u>OCO</u>	<u>FY 2022</u> <u>Total</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>FY 2026</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• OPAF 04 Line Item 845100A: <i>Contingency Operations - Engineering and EOD Equipment</i>	14.752	0.000	61.464	-	61.464	-	-	-	-	-	-

Remarks
Procurement funding for Expedient Small Asset Protection (ESAP) systems, Rapid Airfield Damage Assessment System (RADAS) and Recovery of Airbases Denied by Ordnance (RADBO)in PE 0208028F.

FY21 CE funding reduced due to database system error. BPAC 652895 should equal \$18.920M

D. Acquisition Strategy

This Civil Engineering (CE) Readiness project develops and evaluates technologies for in-garrison, expeditionary, and contingency installations & airbases. This encompasses a wide range of solutions and COTS equipment that are fielded to support the CE mission of the USAF. The acquisition strategy utilizes AFCEC RDT&E

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 0604617F / <i>Agile Combat Support</i>	Project (Number/Name) 652895 / <i>Civil Engineering Readiness</i>
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contracts as well as AFLCMC, GSA, other DoD and US Government laboratories/engineering centers, contracts and other transaction agreements whenever practical for the specific technology development effort.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 0604617F / Agile Combat Support	Project (Number/Name) 652895 / Civil Engineering Readiness
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Product Development (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Airbase Technologies	Various	AFCEC : Tyndall AFB, FL	-	1.698	Oct 2019	1.384		1.350		-		1.350	-	-	-
Airfield Damage Repair (ADR) ERDC	MIPR	USERDC : Vicksburg, MS	-	2.000	Jan 2020	2.072	Jan 2021	2.310		-		2.310	-	-	-
Airfield Damage Repair (ADR)	Various	AFCEC : Tyndall AFB, FL	-	2.400		1.300		0.000		-		0.000	-	-	-
Expeditionary Airfield Damage Repair eADR JCTD	Various	AFCEC : Tyndall AFB, FL	-	8.783		2.000		0.000		-		0.000	-	-	-
Airfield Pavements & Technologies	C/CPFF	ARA Inc : Panama City, FL	-	1.000	Apr 2020	2.500	Oct 2020	2.589		-		2.589	-	-	-
Rapid Explosive Hazard Mitigation (REHM)	C/CPAF	ARA Inc : Panama City, FL	-	0.400		0.000		0.000		-		0.000	-	-	-
EOD & Robotics Technologies	C/CPFF	Torch Technologies : Huntsville, AL	-	1.427	Apr 2020	2.000	Oct 2020	3.650		-		3.650	-	-	-
RADAS Integration	C/CPAF	Torc Robotics : Blacksburg, VA	-	2.100		0.406		-		-		-	-	-	-
Airfield Protection (AP) Infrastructure Hardening	C/CPFF	Battelle : Panama City, FL	-	1.900	Oct 2019	2.075	Dec 2020	2.000		-		2.000	-	-	-
Airfield Protection (AP) Aviation Firefighting Technologies	C/CPFF	Battelle : Panama City, FL	-	0.900	Oct 2019	1.300	Dec 2020	1.050		-		1.050	-	-	-
Energy & Utilities RDT&E	C/CPFF	Battelle : Panama City, FL	-	0.450	Jan 2020	1.000	Oct 2020	0.700		-		0.700	-	-	-
Subtotal			-	23.058		16.037		13.649		-		13.649	-	-	N/A

Remarks
\$77K increase to FY18 ADR due to inflation adjustment

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 0604617F / Agile Combat Support	Project (Number/Name) 652895 / Civil Engineering Readiness
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Support (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Support	C/CPAF	Not specified. : TBD	-	0.000		-		-		-		-	-	-	-
Program Management Administration (PMA)	Various	AFCEC : Tyndall AFB, FL	-	0.325	Apr 2019	0.325	Apr 2021	0.325	Apr 2022	-		0.325	-	-	-
Subtotal			-	0.325		0.325		0.325		-		0.325	-	-	N/A

Remarks
PMA includes travel and supplies to support CE Readiness RDT&E activities.

Management Services (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Management Services	C/CPAF	Not specified. : TBD	-	0.000		-		-		-		-	-	-	-
A&AS Program Support RDT&E	C/FFP	Multiple : FL	-	0.964	Jan 2020	0.964	Oct 2020	0.964	Oct 2021	-		0.964	-	-	-
Subtotal			-	0.964		0.964		0.964		-		0.964	-	-	N/A

	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	-	24.347	17.326	14.938	-	14.938	-	-	N/A

Remarks
Current delta due to most recent updates to ABIDES that is not reflected yet in IDECS.

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Exhibit R-4, RDT&E Schedule Profile: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 0604617F / <i>Agile Combat Support</i>	Project (Number/Name) 652895 / <i>Civil Engineering Readiness</i>
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FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

CE Readiness																												
Airbase Technologies																												
ADR Robotic In-seat Appliques																												
ADR In-situ Material Repair RDT&E																												
ADR Lighter/Leaner Expeditionary Repair																												
REHM Spiral 2 Rapid UXO Clearance																												
RADAS Development, Test & Evaluation																												
Airfield Mitigation and Recovery Robotics																												
AFFF disposal and mitigation technologies																												
Directed Energy Application for UXO Neutralization																												
Civil engineering projects for sustained airbase operations																												
Airfield Protection - Advanced Hardening RDT&E																												
AFFF replacement agent test & evaluation																												

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Exhibit R-4A, RDT&E Schedule Details: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 0604617F / Agile Combat Support	Project (Number/Name) 652895 / Civil Engineering Readiness
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Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
CE Readiness				
Airbase Technologies	1	2020	4	2026
ADR Robotic In-seat Appliques	1	2020	2	2022
ADR In-situ Material Repair RDT&E	1	2020	4	2023
ADR Lighter/Leaner Expeditionary Repair	1	2020	4	2022
REHM Spiral 2 Rapid UXO Clearance	1	2020	4	2023
RADAS Development, Test & Evaluation	1	2020	4	2023
Airfield Mitigation and Recovery Robotics	1	2020	3	2026
AFFF disposal and mitigation technologies	1	2020	4	2024
Directed Energy Application for UXO Neutralization	1	2020	4	2022
Civil engineering projects for sustained airbase operations	1	2020	1	2026
Airfield Protection - Advanced Hardening RDT&E	1	2020	4	2026
AFFF replacement agent test & evaluation	1	2022	4	2026

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force										Date: May 2021		
Appropriation/Budget Activity 3600 / 5					R-1 Program Element (Number/Name) PE 0604617F / <i>Agile Combat Support</i>				Project (Number/Name) 654910 / <i>Aeromedical Readiness</i>			
COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
654910: <i>Aeromedical Readiness</i>	-	6.786	1.654	1.665	0.000	1.665	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

FY21 funding: Due to a database error, FY21 Congressional Mark was applied to BPAC 652895 instead of BPAC 654910 Aeromed. Correct funding for Aeromed BPAC 654910 should be \$0.060M

A. Mission Description and Budget Item Justification

Aeromedical Readiness provides key aeromedical devices and life-saving capabilities and/or quality of life technologies and equipment. This program enables the critical care of combat casualties by further developing and optimizing existing technologies for ground Expeditionary Medical Systems (EMEDS) and Aeromedical evacuation systems. EMEDS and Aeromedical Evacuation systems provide the urgent care needed to treat deployed injured warfighters and return them to duty while in country, and to treat combat casualties that need to be safely transported to a stateside hospital for follow on treatment. The program also supports critical capabilities development in the multi-disciplinary areas for light-weight, durable, and rapidly deployable medical equipment to ensure the Air Force is poised to meet future medical readiness and operational requirements, to include but not limited to Sterile Water for Irrigation, Multi-Channel Infusion Pump (MCIP), Antimicrobial Surface Coatings, Telemedicine and other FDA approved medical treatment devices. This program supports projects ranging from research efforts to optimize human physiologic and cognitive performance for Air Combat Command, to development of patient isolation and transportation devices for Air Mobility Command that enable aeromedical evacuation of patients suffering with highly infectious diseases.

B. Accomplishments/Planned Programs (\$ in Millions)

	FY 2020	FY 2021	FY 2022
Title: Multi-Channel Infusion Pump (MCIP)	0.000	0.000	0.000
Description: A replacement multi-channel infusion pump for use by ACC, AMC, AFSOC, and other DoD medical personnel to replace the obsolete MedSystem III device for use in DoD Hospitals, during expeditionary and en-route care. The pump must be capable of independently and precisely delivering a wide-range of fluids (drugs, nutrients, blood) from separate sources through multiple lines.			
FY 2021 Plans: Program transferring from research to final engineering, manufacturing and development (EMD).			
FY 2022 Plans: Contract Award for EMD phase.			
FY 2021 to FY 2022 Increase/Decrease Statement: Program moving to WNU for further Development			
Title: Point of Care Integrated Blood Analyzer (POCIBA)	0.000	0.000	0.100

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 0604617F / Agile Combat Support	Project (Number/Name) 654910 / Aeromedical Readiness

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2020	FY 2021	FY 2022
<p>Description: Light weight, portable Point of Care (POC) complete blood count (CBC) analyzer with 5-part differential; capable of operating in the pre-hospital environment by field medical teams. Reduces the logistical footprint of the EMEDS by providing a smaller, light weight device with no cold-chain storage requirements and fewer consumables, comparable to the capability in a Role 3 EMEDS. For use by ACC, AMC, and AFSOC personnel</p> <p>FY 2021 Plans: Continue research and prepare for development.</p> <p>FY 2022 Plans: Program transition from research to developmental contract award and test.</p> <p>FY 2021 to FY 2022 Increase/Decrease Statement: To fund EMD contract award preparations and plans.</p>			
<p>Title: Expeditionary Ground Telemedicine (EGTM)</p> <p>Description: Air Force operations are changing significantly in anticipation that future US engagements will be peer or near-peer conflicts in a Multi-Domain Operations battle space. EGTM System of Systems will mold the current medical force and reduces its footprint to treat patients for a prolonged period in support of Dispersed and Distributed Air Base Operations (DDABO) and Agile Combat Employment (ACE) Concepts. EGTM consists of a secure, reliable ability to provide TeleConsult, TeleMedic, TeleMentor, and TeleMonitor capability.</p> <p>FY 2021 Plans: Continue research and prepare scope of developmental effort.</p> <p>FY 2022 Plans: Program transition from research to final developmental contract award and test.</p> <p>FY 2021 to FY 2022 Increase/Decrease Statement: Fund final EMD and Test contract award.</p>	0.000	0.000	0.100
<p>Title: Aeromedical Equipment Testing/Studies/Minor Development</p> <p>Description: Aeromedical supports Defense Health Program, Joint Services and MAJCOM medical modernization. The Air Force Medical Readiness Agency (AFMRA) Surgeon General Requirement Oversight Council (SGROC) Governance process manages medical capability gaps, research and development, funding prioritization and decisional boards. Aeromedical procures and qualifies commercial-off-the-shelf (COTS) or near COTS medical and aeromedical products and/or performs minor development, studies and management efforts, under Aeromedical Readiness. Aeromedical Program efforts evaluate integrating technologies</p>	1.726	1.654	1.465

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 0604617F / <i>Agile Combat Support</i>	Project (Number/Name) 654910 / <i>Aeromedical Readiness</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2020	FY 2021	FY 2022
or prototype systems in a realistic operating environment, expedite technology transition from the laboratory to operational use, emphasis on proving maturity prior to integration and viable decision ready materiel solutions.			
<i>FY 2021 Plans:</i> Continue the transition of Scientific and Technical (S&T) projects to Research and Development (R&D) of various items in Engineering and Manufacturing Development (EMD) phase of the acquisition life cycle.			
<i>FY 2022 Plans:</i> Contract Studies to develop Medical requirements.			
<i>FY 2021 to FY 2022 Increase/Decrease Statement:</i> To fund programs moving to WNU for Development.			
<i>Title:</i> COVID JUON			
<i>Description:</i> Aeromedical equipment to support safe air transport of Covid 19 positive patients			
<i>FY 2021 Plans:</i> Completed in FY20			
<i>FY 2022 Plans:</i> Completed FY20			
<i>FY 2021 to FY 2022 Increase/Decrease Statement:</i> Project completed FY20 no increase or decrease			
Accomplishments/Planned Programs Subtotals	5.060	0.000	0.000
	6.786	1.654	1.665

C. Other Program Funding Summary (\$ in Millions) N/A
Remarks Multi-Modal Threat Detection and Mitigation Congressional Add improperly aligned to BPAC 654910. Funding is being executed out of BPAC 652895. FY21 Aeromed funding incorrect due to database system error. BPAC 654910 should equal \$0.060M
D. Acquisition Strategy Programs will consider a streamlined acquisition approach. Whenever practical, commercial items are tested and evaluated as candidates for providing solutions to user needs. This normally involves contractor characterization, verification, and qualification testing to ensure Food and Drug Administration (FDA) approved, commercial off-the-shelf equipment is properly evaluated to identify any capability gaps that may require minor modifications for military use. However, acquisition strategies may

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity	R-1 Program Element (Number/Name)	Project (Number/Name)
3600 / 5	PE 0604617F / <i>Agile Combat Support</i>	654910 / <i>Aeromedical Readiness</i>

also be carried out for traditional Engineering and Manufacturing Development (EMD). Funds may be used to address associated emerging Aeromedical Readiness requirements and for program management activities.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 0604617F / Agile Combat Support	Project (Number/Name) 654910 / Aeromedical Readiness
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Product Development (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Product Development	C/CPAF	TBD : TBD	-	-		-		0.200	Sep 2023	-		0.200	-	-	-
Technology Transfer Planning for Aeromedical Equipment R&D Efforts, Cost Estimates Technology Readiness Assessments, Food and Drug Administration consulting	TBD	TBD : TBD	-	0.749	Sep 2021	0.000	Sep 2022	1.465	Sep 2023	-		1.465	-	-	-
Multi-Modal Threat Detection and Mitigation	C/CPAF	TBD : TBD	-	6.032	Mar 2020	-		-		-		-	-	-	-
Subtotal			-	6.781		0.000		1.665		-		1.665	-	-	N/A

Management Services (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Management Services	C/CPAF	Not specified. : TBD	-	0.000		-		-		-		-	-	-	-
Program Management Administration	C/CPFF	AFLCMC : Wright-Patterson AFB, OH	-	0.005	Oct 2019	1.654	Oct 2020	-		-		-	-	-	-
Subtotal			-	0.005		1.654		-		-		-	-	-	N/A

	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	-	6.786	1.654	1.665	-	1.665	-	-	N/A

Remarks
 Product Development: Technology Transfer/Aeromedical Equipment is TBD due to contract source selections.
 Multi-Modal Threat Detection and Mitigation Congressional Add improperly aligned to BPAC 654910. Funding is being executed out of BPAC 652895.

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Exhibit R-4, RDT&E Schedule Profile: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 0604617F / <i>Agile Combat Support</i>	Project (Number/Name) 654910 / <i>Aeromedical Readiness</i>
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FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

<i>Aeromedical Readiness RDTE Efforts</i>	
Multi-Channel Infusion Pump MICP	
Point of Care Integrated Blood Analyzer (POCIBA)	
Expeditionary Ground TeleMedicine (EGTM)	
Aeromedical Equipment Testing/Studies/ Minor Development	
<i>Multi-Modal Threat Detection and Mitigation</i>	
Multi-Modal Threat Detection and Mitigation	

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Exhibit R-4A, RDT&E Schedule Details: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 0604617F / <i>Agile Combat Support</i>	Project (Number/Name) 654910 / <i>Aeromedical Readiness</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>Aeromedical Readiness RDTE Efforts</i>				
Multi-Channel Infusion Pump MICP	1	2021	4	2025
Point of Care Integrated Blood Analyzer (POCIBA)	4	2021	4	2025
Expeditionary Ground TeleMedicine (EGTM)	4	2021	4	2025
Aeromedical Equipment Testing/Studies/Minor Development	1	2020	4	2025
<i>Multi-Modal Threat Detection and Mitigation</i>				
Multi-Modal Threat Detection and Mitigation	3	2020	4	2022

Note
Multi-Modal Threat Detection and Mitigation Congressional Add improperly aligned to BPAC 654910. Funding is being executed out of BPAC 652895.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 0604618F <i>Joint Direct Attack Munition</i>
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COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
Total Program Element	0.000	0.000	6.806	0.000	0.000	0.000	-	-	-	-	-	-
653891: <i>JDAM M-Code Integration</i>	0.000	0.000	6.806	0.000	0.000	0.000	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Military Code (M-Code) receivers with Enhanced Anti-Jam (EAJ) will be developed and integrated in order to provide advanced Positioning, Navigation, and Timing (PNT) capabilities to allow operations in anti-access/area denial (A2/AD) environments. M-Code and EAJ also provide increased accuracy, better signal acquisition, and advanced security.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver weapon system capability. The use of such programs funds would be in addition to the civilian pay expenses budgeted in program element 0605831F. In FY20 \$0M was expended for civilian pay expenses in this program element, and in FY21 \$0M is forecasted for civilian pay expenses in this program element

This program is in Budget Activity 5, System Development and Demonstration (SDD) because it has passed Milestone B approval and is conducting engineering and manufacturing development tasks aimed at meeting validated requirements prior to full rate production.

B. Program Change Summary (\$ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Previous President's Budget	0.000	7.926	0.000	0.000	0.000
Current President's Budget	0.000	6.806	0.000	0.000	0.000
Total Adjustments	0.000	-1.120	0.000	0.000	0.000
• Congressional General Reductions	0.000	-1.120			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	0.000	0.000			
• Other Adjustments	0.000	0.000	0.000	0.000	0.000

Change Summary Explanation

Joint Direct Attack Munition (JDAM) M-Code was marked for "PMA unjustified program growth" in the FY21 NDAA.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force	Date: May 2021
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Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 0604618F <i>Joint Direct Attack Munition</i>
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C. Accomplishments/Planned Programs (\$ in Millions)	FY 2020	FY 2021	FY 2022
<p>Title: M-Code/Enhanced Anti-Jam (EAJ)</p> <p>Description: Develop and integrate M-Code receivers with EAJ to provide advanced Positioning, Navigation, and Timing (PNT) capabilities, providing the capability to operate in adversarial anti-access/area denial (A2/AD) environments. M-Code receivers with EAJ also provides increased accuracy, better signal acquisition, and advanced security.</p> <p>FY 2021 Plans: FY21 funding will support qualification testing for M-Code/EAJ.</p> <p>FY 2022 Plans: N/A</p> <p>FY 2021 to FY 2022 Increase/Decrease Statement: Funding decreased because work will be completed with residual funds and prepared for a transition to production.</p>	0.000	6.806	0.000
Accomplishments/Planned Programs Subtotals	0.000	6.806	0.000

D. Other Program Funding Summary (\$ in Millions)

<u>Line Item</u>	<u>FY 2020</u>	<u>FY 2021</u>	<u>FY 2022</u> <u>Base</u>	<u>FY 2022</u> <u>OCO</u>	<u>FY 2022</u> <u>Total</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>FY 2026</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• RDTE 04 PE 0604201F: <i>Integrated Avionics Planning and Development</i>	120.267	-	39.742	-	39.742	-	-	-	-	-	-

Remarks

E. Acquisition Strategy

M-Code/EAJ effort uses a Family of Systems approach where the three prime weapons contractors develop receivers capable of operating in any of their AF weapons. The receivers are based on a common, internally-developed Interface Requirements Specification, Technical Requirements Document, and threat scenario. This approach uses a combination of contract types based on acquisition phase (Technology Maturation and Risk Reduction, Development, Production) and risk. The Weapons System Program Offices share a common development program element to allow flexibility in funding and planning, switching to individual PEs for receiver integration, operational testing, and production. The M-Code/EAJ Weapons Receiver Development effort leverages technology currently under development by the Global Positioning System (GPS)-D Military GPS User Equipment (MGUE) program and will provide the warfighter with unmatched capability to operate in future A2/AD environments.

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Exhibit R-4, RDT&E Schedule Profile: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 0604618F / <i>Joint Direct Attack Munition</i>	Project (Number/Name) 653891 / <i>JDAM M-Code Integration</i>
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	FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

M-Code/EAJ Receivers	
M-Code/EAJ Test and Evaluation	[REDACTED]

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Exhibit R-4A, RDT&E Schedule Details: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 0604618F / <i>Joint Direct Attack Munition</i>	Project (Number/Name) 653891 / <i>JDAM M-Code Integration</i>
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Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>M-Code/EAJ Receivers</i>				
M-Code/EAJ Test and Evaluation	3	2021	3	2022

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force / BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 0604706F / <i>Life Support Systems</i>
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COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
Total Program Element	-	14.137	28.608	25.437	0.000	25.437	-	-	-	-	-	-
65412A: <i>Life Support Systems</i>	-	14.137	28.608	25.437	0.000	25.437	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-	-	-

A. Mission Description and Budget Item Justification

This program saves Airmen's lives and improves aircrew performance through better aircrew flight equipment and airman combat systems. Air Force acquisition teams lead the upgrade and fielding of new equipment/systems by assessing deficiencies in existing equipment, identifying and assessing existing products or developing new technology, and conducting required Safe-to-Fly tests, certifications, and studies. Program efforts include, but are not limited to, the following projects: directed energy protective equipment; flight helmets and visors; oxygen breathing systems for aircrew; radios and locator beacons; support equipment; nuclear flash blindness protection; night vision devices; noise reduction devices; all types of flight suits/ensembles to protect aircrew against all environmental threats; anti-gravity (anti-G) suits; flame resistant, retardant and blast/ballistic protective gear; aircraft seating; impact protection equipment; flotation devices; parachutes; ejection systems; post-ejection survival systems; all equipment, from head to toe, to enable aircrew to safely and effectively perform their mission, and survive post-ejection; physiological monitoring devices and other aircrew/life support/ground crew systems required by the warfighter.

This program element may include necessary emergent or unanticipated civilian pay expenses required to manage, execute, and deliver insert program name for emergent or unanticipated weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program element 0605831F. In FY20 no funds was expended for civilian pay expenses in this program element, and in FY21 \$0.678M is forecasted for civilian pay expenses in this program element.

This program is in Budget Activity 5, System Development and Demonstration (SDD) because it has passed Milestone B approval and is conducting engineering and manufacturing development tasks aimed at meeting validated requirements prior to full rate production.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force / BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 0604706F / <i>Life Support Systems</i>
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B. Program Change Summary (\$ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Previous President's Budget	14.624	23.660	23.973	0.000	23.973
Current President's Budget	14.137	28.608	25.437	0.000	25.437
Total Adjustments	-0.487	4.948	1.464	0.000	1.464
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	5.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	-0.487	-0.052			
• Other Adjustments	0.000	0.000	1.464	0.000	1.464

Congressional Add Details (\$ in Millions, and Includes General Reductions)

Project: 65412A: *Life Support Systems*

Congressional Add: *Physiological Monitoring*

Congressional Add: *Next Generation Ejection Seat Congressional Add*

Congressional Add Subtotals for Project: 65412A

Congressional Add Totals for all Projects

	FY 2020	FY 2021
	-	5.000
	5.800	-
Congressional Add Subtotals for Project: 65412A	5.800	5.000
Congressional Add Totals for all Projects	5.800	5.000

Change Summary Explanation

FY21 Increase of \$5M Congressional Add for Unexplained Physiological Events (UPE) for pilot monitoring and alerting.

FY22 Increase for anthropometric studies and scanners.

C. Accomplishments/Planned Programs (\$ in Millions)	FY 2020	FY 2021	FY 2022
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Title: Aircrew Performance Studies/Technology Projects and Minor Development Efforts

Description: Air Force Life Cycle Management Center's Aircrew Performance Branch is the single USAF focal point for Aircrew Flight Equipment (AFE) Safe-to-Fly (STF) testing certification, addressing Safety Investigation Board (SIB) recommendations, along with studies and analysis. In addition, funding is for efforts that are responses to real-time capability gaps identified by the warfighter which may be satisfied by testing and qualifying commercial-off-the-shelf (COTS) products and/or performing minor development efforts that require less than 10M per year related to aircrew flight equipment and life support equipment. Previous successful efforts may evolve into enduring capabilities as other users / MAJCOMs seek to incorporate these STF assets into their inventory. Integrated Aircrew Ensemble (IAE), Aircrew Body Armor (ABA), Aircrew Laser Eye Protection - Technical Insertion

	4.912	8.818	10.710
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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force		Date: May 2021		
Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 5: System Development & Demonstration (SDD)</i>		R-1 Program Element (Number/Name) PE 0604706F / <i>Life Support Systems</i>		
C. Accomplishments/Planned Programs (\$ in Millions)		FY 2020	FY 2021	FY 2022
<p>(ALEP-TI), Next Generation Fixed Wing Helmet (NGFWH), BA-X Low Profile Parachute (LPP) and Nuclear Flash Blindness Goggles (NFBG) are currently the active programs within Life Support Systems (LSS). Funds may be used to address associated emerging aircrew/ground crew/egress requirements and for program management activities.</p> <p>FY 2021 Plans: Perform STF testing and certification of COTS products. Address SIB recommendations. Continue the development/test efforts of aircrew laser eye protection - technical insertion (ALEP-TI) radio upgrades, next generation fixed wing helmet, next generation nuclear flash blindness technology, and improvement of parachute/flotation devices.</p> <p>FY 2022 Plans: Perform STF testing and certification of COTS products. Address SIB recommendations. Continue the development/test efforts of aircrew laser eye protection - technical insertion (ALEP-TI) radio upgrades, next generation fixed wing helmet, next generation nuclear flash blindness technology, and improvement of parachute/flotation devices.</p> <p>FY 2021 to FY 2022 Increase/Decrease Statement: Increase tied to next generation nuclear flash blindness development</p>				
<p>Title: Next Generation Ejection Seat</p> <p>Description: The new ejection seat escape system shall safely accommodate greater variation in aircrew minimum/maximum weights, a minimum aircrew sitting height of 31 inches, and the use of Helmet Mounted Displays. It shall reduce the risk of injuries to the arms and legs (especially limb flail), neck, and spinal column throughout the entire ejection event.</p> <p>FY 2021 Plans: Continue contract effort awarded as part of Congressional add for initial system qualification, test assets, and training materials. Baseline system qualification will validate a common ejection system design for integration in F-15, F-16, F-22, and A-10 aircraft.</p> <p>FY 2022 Plans: Continue contract effort awarded for aircraft integration qualification testing for follow-on NGES variants. Delta effort for F-16 is scheduled to begin in FY22 to support continuous ejection system qualification.</p> <p>FY 2021 to FY 2022 Increase/Decrease Statement: Increase due to additional anthropometric efforts</p>		-	9.584	10.000
<p>Title: Female Airmen Equipment</p> <p>Description: Female Fitment within Human Systems Division (HSD) of the Air Force Life Cycle Management Center develops and sustains organizational issued equipment (OCIE) & personal protective equipment (PPE) for female Airmen to enhance mission performance while improving safety and survival. HSD aligned Female Fitment as a top priority, matching CSAF vision,</p>		3.425	5.206	4.727

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force	Date: May 2021
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Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force</i> / BA 5: <i>System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 0604706F / <i>Life Support Systems</i>
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C. Accomplishments/Planned Programs (\$ in Millions)	FY 2020	FY 2021	FY 2022
<p>and ensures that as best possible, the fullest extent of the AF female anthropometric range is incorporated into all of its programs. Outreach with other AF organizations and sister services ensures that requirements are collected to vector current and future programs. Anthropometric data collection ensures that these programs produce the OCIE and PPE that will allow women to perform their best in the missions they are assigned. OCIE and PPE for female aircrew includes, but is not limited to, the development and/or refinement of flight suits, bladder relief systems, helmets, ejection seats, G-suits, aircrew body armor, oxygen masks, and feedback mechanisms.</p> <p>FY 2021 Plans: Continue testing and development of female flight equipment. Items anticipated to be worked, but not limited to, include the AF GearFit App for aircrew members to provide equipment feedback and suggestions, In-flight bladder relief projects, female flight suits, aircrew harnesses, aircrew body armor, and anthropometric studies</p> <p>FY 2022 Plans: Continue testing and development of female flight equipment: Items anticipated to be worked, but not limited to, include the AF GearFit App, in-flight bladder relief, aircrew harness, oxygen masks, and anthropometric studies</p> <p>FY 2021 to FY 2022 Increase/Decrease Statement: The plus up from FY21 continuing into FY22 allows for work to match the pace established by CSAF for expediting projects to the field.</p>			
Accomplishments/Planned Programs Subtotals	8.337	23.608	25.437

	FY 2020	FY 2021
Congressional Add: Physiological Monitoring	-	5.000
FY 2021 Plans: The Physiological Monitoring Congressional Add will be acquiring test assets required to evaluate SPYDR system and perform Developmental Test.		
Congressional Add: Next Generation Ejection Seat Congressional Add	5.800	-
FY 2020 Accomplishments: EMD Contract Award to begin qualification testing of selected seat and receive long lead items.		
Congressional Adds Subtotals	5.800	5.000

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force	Date: May 2021
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Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 0604706F / <i>Life Support Systems</i>
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D. Other Program Funding Summary (\$ in Millions)

<u>Line Item</u>	<u>FY 2020</u>	<u>FY 2021</u>	<u>FY 2022</u> <u>Base</u>	<u>FY 2022</u> <u>OCO</u>	<u>FY 2022</u> <u>Total</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>FY 2026</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• OPAF 04 Line Item 842990: <i>Items Less Than \$5 Million</i> <i>(Safety and Rescue Equipment)</i>	72.540	24.407	62.195	-	62.195	-	-	-	-	-	-

Remarks

E. Acquisition Strategy

The majority of efforts funded in this project employ a streamlined acquisition approach. Whenever practical, Government-Off-The-Shelf/Commercial-Off-The-Shelf (GOTS/COTS) items are tested and evaluated as candidates for solutions to user needs. This normally involves characterization, verification, and qualification testing to ensure GOTS/COTS equipment is properly certified and adapted for military purposes. However, acquisition strategies may be carried out at the project level for traditional Engineering and Manufacturing Development (EMD), e.g., Integrated Aircrew Ensemble (IAE) and Aircrew Laser Eye Protection - Technical Insertion (ALEP-TI). Funds may be used to address associated emerging aircrew/ground crew/egress requirements and for program management activities.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 0604706F / <i>Life Support Systems</i>	Project (Number/Name) 65412A / <i>Life Support Systems</i>
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Product Development (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Congressional Add for Physiological Monitoring	Various	Not specified : TBD	-	-		4.849		-		-		-	-	-	-
Aircrew Performance Studies/Technology Projects/Minor Development Efforts	Various	Multiple Contractors : TBD	-	2.757		5.918	Jan 2021	8.830	Jan 2022	-		8.830	-	-	-
Integrated Aircrew Ensemble (IAE)	C/FPIF	Tiax : Lexington, MA	-	0.180	Jan 2020	0.081	Jan 2021	-		-		-	-	-	-
Next Generation Ejection Seat (NGES)	SS/FPIF	Collins Aerospace : Colorado Springs, CO	-	5.800	Feb 2020	9.584	Nov 2020	10.000	Nov 2021	-		10.000	-	-	-
Female Flight Equipment	Various	Multiple Contractors : TBD	-	3.425	Dec 2019	5.206	Dec 2020	4.727	Dec 2021	-		4.727	-	-	-
Subtotal			-	12.162		25.638		23.557		-		23.557	-	-	N/A

Test and Evaluation (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Program Tests (IAE, ACES, NGFWH, etc.)	Various	Various : Various, NV	-	1.250		1.650		1.230		-		1.230	-	-	-
Subtotal			-	1.250		1.650		1.230		-		1.230	-	-	N/A

Management Services (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Program Management Administration (PMA)	TBD	AFLCMC : Wright-Patterson AFB, OH	-	0.725		1.320		0.650		-		0.650	-	-	-
Subtotal			-	0.725		1.320		0.650		-		0.650	-	-	N/A

Remarks
PMA Description: Program Management Support and Travel.

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Exhibit R-4, RDT&E Schedule Profile: PB 2022 Air Force **Date: May 2021**

Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 0604706F / <i>Life Support Systems</i>	Project (Number/Name) 65412A / <i>Life Support Systems</i>
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FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

<i>Life Support Systems RDTE Efforts</i>																																
Aircrew Performance Aircrew Laser Eye Protection - Technical Insertion (ALEP-TI)																																
Continue projects in support of Aircrew Performance/Female Equipment																																
Aircrew Performance Next Generation Fixed Wing Helmet Development																																
Next Generation Ejection Seat Qualification Effort																																
Integrated Aircrew Ensemble G-Suit Redesign																																
Female Bladder Relief LRIP																																
A2CU-F LRIP																																
Maternity FDU LRIP																																

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Exhibit R-4A, RDT&E Schedule Details: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 0604706F / <i>Life Support Systems</i>	Project (Number/Name) 65412A / <i>Life Support Systems</i>
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Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>Life Support Systems RDTE Efforts</i>				
Aircrew Performance Aircrew Laser Eye Protection - Technical Insertion (ALEP-TI)	1	2020	4	2025
Continue projects in support of Aircrew Performance/Female Equipment	1	2020	4	2025
Aircrew Performance Next Generation Fixed Wing Helmet Development	2	2020	3	2022
Next Generation Ejection Seat Qualification Effort	4	2020	4	2025
Integrated Aircrew Ensemble G-Suit Redesign	1	2021	3	2024
Female Bladder Relief LRIP	2	2021	2	2022
A2CU-F LRIP	1	2022	1	2023
Maternity FDU LRIP	1	2022	1	2023

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 0604735F / <i>Combat Training Ranges</i>
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COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
Total Program Element	-	52.678	23.854	23.980	0.000	23.980	-	-	-	-	-	-
652286: <i>Combat Training Range Equipment</i>	-	52.678	23.854	23.980	0.000	23.980	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-	-	-

Note

This program, BA 5, PE 0604735F, project 652286, Modernization Range Threat Systems (RTS), is a new start.

A. Mission Description and Budget Item Justification

The Combat Training Ranges (CTR) program provides equipment and support to Air Force units and combat training ranges for Electronic Warfare (EW) mission testing, training, and evaluation of aircrews, as well as operational testing of weapon systems and tactics under simulated combat conditions. This program provides funding for the development and integration of EW training capabilities to include: Air Combat Training Systems (ACTS); threat emitters; advanced radar threat systems; communication jammers; command and control and debrief capability; and instrumentation equipment/systems. These systems and capabilities support integrated training operations for all aircraft (including 5th Generation) and for Joint, Coalition, and Live, Virtual, Constructive (LVC) training events.

The Advanced Radar Threat System (ARTS) programs design, develop, build, and test threat systems based on advanced foreign fielded surface-to-air missile (SAM) radar threat systems. The ARTS variants will be used at Department of Defense (DoD) training ranges for 4th and 5th Generation aircrew training and tactics development to increase combat effectiveness and aircrew survivability by training aircrews to engage or defend against an advanced SAM threat before encountering it in actual combat to stress their tactics, techniques and procedures. The ARTS programs support early research, studies, technology development, and planning for next-generation threat systems. The ARTS programs also fund development of high-fidelity surrogate targets matching simulated threat systems to stress 5th Generation sensor fusion capabilities.

The Modernization Range Threats Systems (RTS) efforts fund development of modifications for range threat systems to provide continued combat training relevancy and enhanced systems capabilities. RTS efforts include Multiple Threat Emitter System (MUTES), Miniature Multiple Threat Emitter System (Mini-MUTES), Modular Threat Emitter (MTE) system, Tactical Radar Threat Generator (TRTG) system, Band Simulator, Unmanned Modular Threat Emitter (UMTE) system, and Joint Threat Emitter (JTE) system. Enhancements focus on upgrading threat systems to match fielded modifications for foreign threat systems faced by combat aircrews. The Common Electronic Attack Receiver (CEAR) provides reactive training and enhanced debriefs using legacy threats. The CEAR is being expanded to the Mini-MUTES and MUTES to provide commonality and reactive training and enhance debriefs using legacy threats. The Modernization Systems effort upgrades Band Simulator and other legacy emitters with modern electronics to improve threat relevance and sustainability. The Double Digit Threat Emitter (DDTE) effort leverages JTE to provide greater on-range threat density of advanced SAM radars. The B-Pedestal modification will provide double-digit threat capability to Mini-MUTES B-Pedestals.

The P5 Combat Training System (P5 CTS) program addresses new capability requirements for the fielded P5 system, to include continued operations in a global positioning system (GPS)-contested environment. This will enable ongoing analyses, studies, risk reduction efforts, and/or technology development to enhance

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force	Date: May 2021
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Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 0604735F / <i>Combat Training Ranges</i>
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Operational Training Infrastructure (OTI), such as combat training range equipment integration into a blended training architecture, communication and GPS jammers, weapon drop scoring systems, and infrastructure networks. These enhancements will add a critical dimension to exercises and optimize warfighter training throughout the program's lifecycle through 2030. The P6 Combat Training System (P6 CTS) will focus on Time-Space-Position Information (TSPI) infrastructure to support emitters, EW, and live training for 4th and 5th Gen participants. The Air Force will leverage the Department of the Navy's Tactical Combat Training System Increment II (TCTS II) program to satisfy P6 CTS requirement and replace the P5 CTS.

The Live Mission Operations Capability (LMOC) program will regionalize and standardize training airspace, threat systems, and control centers to better challenge 5th Generation aircraft and aircrew and provide comprehensive training support for warfighters. It will provide a node-based enterprise that integrates all range system capabilities, including pre/post mission coordination, in a multi-level secure environment to enable blended training for combat and combat support units, including F-35. It will address three combat training capability requirements: build and display an integrated surface and air picture; manage training; and enable LVC training operations. LMOC will field in three strategic steps: 1) Deliver a common hardware software platform called "WarRoom" to each training location. 2) Link each site via a Live Mission Operations Network (LMON) to the LMOC System Integration Lab (SIL) which is the only DoD run software factory dedicated to Operational Test and Training Infrastructure (OTTI). 3) Field a Multi-Level Security (MLS) architecture that enables LMOC to connect all live training systems, co-locate training data, and securely allow access at the individual security classification level of each user.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver weapon system capability. The use of such programs funds would be in addition to the civilian pay expenses budgeted in program element 0605831F. In FY20 \$0M was expended for civilian pay expenses in this program element, and in FY21 \$0M is forecasted for civilian pay expenses in this program element.

This program is in Budget Activity 5, System Development and Demonstration (SDD) because it has passed Milestone B approval and is conducting engineering and manufacturing development tasks aimed at meeting validated requirements prior to full rate production.

B. Program Change Summary (\$ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Previous President's Budget	52.365	8.898	23.959	0.000	23.959
Current President's Budget	52.678	23.854	23.980	0.000	23.980
Total Adjustments	0.313	14.956	0.021	0.000	0.021
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	15.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	1.999	0.000			
• SBIR/STTR Transfer	-1.686	0.000			
• Other Adjustments	0.000	-0.044	0.021	0.000	0.021

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force	Date: May 2021
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Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 0604735F / <i>Combat Training Ranges</i>
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Congressional Add Details (\$ in Millions, and Includes General Reductions)	FY 2020	FY 2021
Project: 652286: <i>Combat Training Range Equipment</i>		
Congressional Add: <i>F-35 Advanced Threat Simulator</i>	15.000	0.000
Congressional Add: <i>Training Range Instrumentation</i>	0.000	15.000
Congressional Add Subtotals for Project: 652286	15.000	15.000
Congressional Add Totals for all Projects	15.000	15.000

Change Summary Explanation

FY21 Congressional Add: These funds will be used to advance and develop systems that will directly support the Gulf of Mexico range. This development will enable critical systems to be fielded in the Gulf of Mexico area sooner.

C. Accomplishments/Planned Programs (\$ in Millions)	FY 2020	FY 2021	FY 2022
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Title: P5 Combat Training System (CTS)	0.350	0.500	0.000
Description: P5 CTS funding supports ACTS capabilities and includes the development, integration and testing of future software/hardware upgrades, aircraft/pod integration, upgrades for range applications, and associated studies. Additionally, funding supports efforts to enable initial training interoperability with 5th Generation aircraft via Ground Subsystem (GS) decryption of secure (encrypted) Time, Space, Position Information (TSPI), weapon simulation, and other training data.			
FY 2021 Plans: Funding supports the study, development and test of a Production Representative Article (PRA) for GPS-contested training upgrade for P5 CTS. Funding will also be used to study optimization of message format and priority in support of Performance Based Training (PBT) objectives.			
FY 2022 Plans: Funding will support completion of GPS Contested mod kit pre-production testing and/or to study optimization of P5 message format/priority in support of PBT objectives.			
FY 2021 to FY 2022 Increase/Decrease Statement: Funding decreased due to the transition of the GPS-contested training upgrade to production.			

Title: Modernization Range Threat Systems (RTS)	0.000	0.000	0.100
Description: Modernization Systems efforts fund development of modifications for range threat systems to provide continued combat training relevancy and enhanced systems capabilities. Range threat systems include MUTES, Mini-MUTES, MTE system, TRTG system, Band Sim, UMTE system, legacy JTE system, and other radar systems fielded throughout the combat training			

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force		Date: May 2021		
Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 5: System Development & Demonstration (SDD)</i>		R-1 Program Element (Number/Name) PE 0604735F / <i>Combat Training Ranges</i>		
C. Accomplishments/Planned Programs (\$ in Millions)		FY 2020	FY 2021	FY 2022
<p>range enterprise. Enhancements focus on upgrading threat systems to match fielded modifications for foreign threat systems faced by combat aircrews. The CEAR provides reactive training and enhanced debriefs using legacy threats. The CEAR is being expanded to the Mini-MUTES and MUTES to provide commonality and reactive training and enhance debriefs using legacy threats. The Modernization Systems effort upgrades the Band Sim and other legacy emitters with modern electronics to improve threat relevance and sustainability. The Double Digit Threat Emitter (DDTE) effort leverages JTE to provide greater on-range threat density of advanced SAM radars. The B-Pedestal modification will provide double-digit threat capability to Mini-MUTES B-Pedestals.</p> <p>FY 2021 Plans: N/A</p> <p>FY 2022 Plans: Funding will support RDT&E effort for Mini-MUTES modification upgrades to existing hardware and software to enable improved threat relevance to support combat training missions to include but not limited to simulated surface to air missiles (SAM) warfare training.</p> <p>FY 2021 to FY 2022 Increase/Decrease Statement: Funding increased to support B-Pedestal modification.</p>				
<p>Title: Advanced Radar Threat System-Variant 1 (ARTS-V1)</p> <p>Description: ARTS-V1 program will design, develop, build and test radar threat systems based on advanced strategic, long-range, re-locatable foreign fielded Surface-to-Air Missile (SAM) radar threat systems. ARTS-V1 will leverage an existing DoD test resource development program to reduce non-recurring development cost, minimize schedule risk, and promote range interoperability between test and training. While various aircraft platforms will train against ARTS-V1, the focus of the program is to develop realistic radar threat systems meant to stress 5th Generation aircraft capabilities. Additionally, development of a high-fidelity surrogate target, ongoing analyses, studies, and risk reduction efforts will focus on integrating ARTS and other systems into regional range and LVC architectures.</p> <p>FY 2021 Plans: Funding supports final development (including but not limited to technical design reviews, integration, fabrication and testing) of a Production Representative Article (PRA) along with finalization of the technical data package (TDP). Additionally, funding supports ongoing analyses and studies focused on integrating ARTS into regional range and LVC architectures.</p> <p>FY 2022 Plans:</p>		6.069	6.124	0.314

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force		Date: May 2021		
Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 5: System Development & Demonstration (SDD)</i>		R-1 Program Element (Number/Name) PE 0604735F / <i>Combat Training Ranges</i>		
C. Accomplishments/Planned Programs (\$ in Millions)		FY 2020	FY 2021	FY 2022
<p>Funding will support initial PRA spares, and further development, above threshold requirements, including but not limited to objective threat capabilities and radar cross section shells. Program is transitioning from PRA development to low rate initial production in FY22.</p> <p>FY 2021 to FY 2022 Increase/Decrease Statement: Funding decreased due to transition from PRA development to production in FY22.</p>				
<p>Title: Advanced Radar Threat System-Variant 2 (ARTS-V2)</p> <p>Description: ARTS-V2 program will design, develop, build and test radar threat systems based on an advanced tactical, mobile, short/medium range foreign fielded SAM radar threat system. Additionally, development of a high-fidelity surrogate target, ongoing analyses, studies, and risk reduction efforts will focus on integrating ARTS-V2 and other systems into LVC architectures.</p> <p>FY 2021 Plans: Funding supports completion of the development (technical design reviews, integration, fabrication and testing) of a PRA under the engineering manufacturing development (EMD) contract. Additionally, funding supports ongoing analyses and studies focused on integrating ARTS into regional range and LVC architectures.</p> <p>FY 2022 Plans: Funding will support, but not limited to, additional testing events.</p> <p>FY 2021 to FY 2022 Increase/Decrease Statement: Funding decreased due to transition from PRA development to production in FY22.</p>		22.100	1.151	0.100
<p>Title: Advanced Radar Threat System-Variant 3 (ARTS-V3)</p> <p>Description: ARTS-V3 program will design, develop, build and test advanced surface-to-air threat systems replicating strategic/tactical threat(s) at the fidelity necessary to stress current EW systems, 5th Generation and beyond air platform engagements and be integrated into a future Combat Air Forces (CAF) LVC system. ARTS-V3 is intended to be a modular system with growth capability to add future advanced Surface-to-Air-Missile (SAM) threats. ARTS-V3 will provide an anti-access area denied (A2/AD) environment for CAF test and training with highly reactive threat systems that provide immediate feedback to aircrews. The ARTS-V3 system will create a relevant combat training threat system that is dynamic and represent a modern and dynamic adversary force. Additionally, development of a high-fidelity surrogate target, ongoing analyses, studies, and risk reduction efforts will focus on integrating ARTS-V3 and other systems into LVC architectures.</p> <p>FY 2021 Plans:</p>		2.149	0.879	23.266

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force		Date: May 2021		
Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 5: System Development & Demonstration (SDD)</i>		R-1 Program Element (Number/Name) PE 0604735F / <i>Combat Training Ranges</i>		
C. Accomplishments/Planned Programs (\$ in Millions)		FY 2020	FY 2021	FY 2022
<p>Funding supports, but is not limited to intelligence and requirements support, early research, studies, risk reduction, technology maturation, and prototyping to reduce program risk. Funds will also support intelligence data to ensure emulation of the real world system is relevant and realistic.</p> <p>FY 2022 Plans: Funding will support further technology maturation leading to full PRA development. Activities that include but are not limited to technical design reviews, integration, fabrication and testing of a PRA.</p> <p>FY 2021 to FY 2022 Increase/Decrease Statement: Funding increased to start Model Based System Engineering (MBSE) effort to develop a V3 digital model in support of full PRA development.</p>				
<p>Title: Advanced Radar Threat System-Variant 4 (ARTS-V4)</p> <p>Description: ARTS-V4 program will design, develop, build, and test modern surface-to-air threat systems replicating tactical highly mobile threats at the fidelity necessary to stress current EW systems, 5th Generation and beyond air platform engagements, and be integrated into a future CAF LVC system. The ARTS-V4 system will create a relevant combat training threat system that is dynamic and represents adversary forces. Additionally funding will support ongoing analyses and studies focused on integrating ARTS into regional range and LVC architectures.</p> <p>FY 2021 Plans: Funding supports intelligence and requirement support, early research, studies, risk reduction, technology maturation, prototyping to reduce program risk. Funding also supports intelligence data to ensure emulation of the real work system is relevant and realistic.</p> <p>FY 2022 Plans: Funding will support intelligence and requirement support, early research, studies, risk reduction, technology maturation and prototyping to reduce program risk. Funding also supports intelligence data to ensure emulation of the real work system is relevant and realistic.</p> <p>FY 2021 to FY 2022 Increase/Decrease Statement: N/A</p>		2.554	0.100	0.100
<p>Title: Live Mission Operations Capability (LMOC)</p> <p>Description: LMOC will regionalize and standardize training airspace, threat systems, and control centers to better challenge 5th Generation aircraft and aircrew and provide comprehensive training support for all warfighters. It will provide a node-based enterprise that integrates all range system capabilities, including pre/post mission coordination, in a multi-level secure environment to enable blended live-synthetic training for combat and combat support units including F-35. It will address three</p>		4.456	0.100	0.100

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force	Date: May 2021
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Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 0604735F / <i>Combat Training Ranges</i>
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C. Accomplishments/Planned Programs (\$ in Millions)	FY 2020	FY 2021	FY 2022
combat training capability requirements: build and display an integrated surface and air picture; manage training; and enable LVC training operations.			
<i>FY 2021 Plans:</i> Funding supports delivering a common hardware software platform called "WarRoom" to each training location, link each site via a Live Mission Operations Network (LMON) to the LMOC System Integration Lab (SIL) which is the only DoD run software factory dedicated to Operational Test and Training Infrastructure (OTTI) and field a Multi-Level Security (MLS) architecture that enables LMOC to connect all live training systems, co-locate training data all in one place, and allow access at the individual security classification level of each user.			
<i>FY 2022 Plans:</i> Funding continues to deliver a common hardware software platform called "WarRoom" to each training location, link each site via a Live Mission Operations Network (LMON) to the LMOC SIL and field a MLS architecture. Funding will also be used for a government Special Access Programs Security Officer dedicated to OTI training systems.			
<i>FY 2021 to FY 2022 Increase/Decrease Statement:</i> N/A			
Accomplishments/Planned Programs Subtotals	37.678	8.854	23.980

	FY 2020	FY 2021
<i>Congressional Add:</i> F-35 Advanced Threat Simulator	15.000	0.000
<i>FY 2020 Accomplishments:</i> FY20 funding will be used to design, develop, and install digital upgrades to improve the fidelity and Electronic Warfare (EW) scenarios for F-35 and other aircrews during Live, Virtual and Constructive test and training events, increasing warfighter interoperability and survivability.		
<i>FY 2021 Plans:</i> N/A		
<i>Congressional Add:</i> Training Range Instrumentation	0.000	15.000
<i>FY 2020 Accomplishments:</i> N/A		
<i>FY 2021 Plans:</i> FY21 funding will be used for the following efforts: --ARTS-V3 funds will support live SAM-threat test and combat training missions to be delivered to the Gulf Coast Range Complex.		

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 0604735F / <i>Combat Training Ranges</i>
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	FY 2020	FY 2021
--P5 to P6 funds will focus on TSPI infrastructure to support emitters, electronic warfare, and live training for 4th and 5th Gen participants. The main effort will be on USAF unique requirements for the P6 to fully replace P5 capability and meet USAF unique mission-sets. --LMOC funds will develop live and constructive training infrastructure within the region to support all aspects of live training for 4th and 5th Gen platforms.		
Congressional Adds Subtotals	15.000	15.000

D. Other Program Funding Summary (\$ in Millions)

<u>Line Item</u>	<u>FY 2020</u>	<u>FY 2021</u>	<u>FY 2022</u> <u>Base</u>	<u>FY 2022</u> <u>OCO</u>	<u>FY 2022</u> <u>Total</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>FY 2026</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• OPAF 03 Line Item 834190: <i>Combat Training Ranges</i>	264.482	193.185	240.194	-	240.194	-	-	-	-	-	-
• OPAF 05 Line Item 861900: <i>Spares and Repair Parts</i>	20.910	8.241	2.866	-	2.866	-	-	-	-	-	-
• APAF 07 Line Item 000075: <i>Other Production Charges</i>	0.300	3.495	0.294	-	0.294	-	-	-	-	-	-

Remarks

E. Acquisition Strategy

The acquisition strategy varies by effort. Overall strategy is competition focused, with the use of but not limited to other transaction authority, cost plus and fixed price contracts.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 0604735F / <i>Combat Training Ranges</i>	Project (Number/Name) 652286 / <i>Combat Training Range Equipment</i>
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Product Development (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Advanced Radar Threat System-Variant 1 (ARTS-V1) Development	Various	Various : Pax River, MD	-	4.240	Dec 2019	4.847	Oct 2020	0.251	Nov 2021	-		0.251	-	-	-
Advanced Radar Threat System-Variant 2 (ARTS-V2)	C/FPIF	Lockheed Martin : Grand Prairie, TX	-	15.431	Nov 2019	0.246	Sep 2021	0.080	Dec 2021	-		0.080	-	-	-
Advanced Radar Threat System-Variant 3 (ARTS-V3)	C/TBD	Various : TBD	-	-		11.200	Aug 2021	18.706	Jan 2022	-		18.706	-	-	-
Advanced Radar Threat System-Variant 3 (ARTS-V3) Development	Various	Various : Hill AFB, UT	-	1.500	Mar 2020	0.420	Sep 2021	-		-		-	-	-	-
Advanced Radar Threat System-Variant 4 (ARTS-V4) Development	Various	Various : Hill AFB, UT	-	2.048	Nov 2019	0.310	May 2021	0.081	Nov 2021	-		0.081	-	-	-
P6 CTS	Various	Various : Hill AFB, UT	-	-		1.200	May 2021	-		-		-	-	-	-
P5 CTS GPS Contested	SS/FFP	Cubic Defense Agency : San Diego, CA	-	0.200	May 2020	0.215	Jan 2021	-		-		-	-	-	-
Modernization Systems	Various	Various : Hill AFB, UT	-	-		-		0.080	Nov 2021	-		0.080	-	-	-
Live Mission Operation Capability (LMOC)	Various	Various : Hill AFB, UT	-	3.754	Mar 2020	1.000	May 2021	-		-		-	-	-	-
Subtotal			-	27.173		19.438		19.198		-		19.198	-	-	N/A

Support (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Advanced Radar Threat Systems (Direct Msn Spt)	Various	Various : Various	-	2.526	Dec 2019	2.092	Dec 2020	1.150	Dec 2021	-		1.150	-	-	-

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Air Force												Date: May 2021				
Appropriation/Budget Activity				R-1 Program Element (Number/Name)				Project (Number/Name)								
3600 / 5				PE 0604735F / Combat Training Ranges				652286 / Combat Training Range Equipment								
Support (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total				
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract	
Subtotal			-	2.526		2.092		1.150		-		1.150	-	-	N/A	
Test and Evaluation (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total				
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract	
Advanced Radar Threat Systems (Direct Msn Spt)	C/Various	Not specified. : TBD	-	3.236	Jun 2020	0.770	Oct 2020	1.473	Oct 2021	-		1.473	-	-	-	
Subtotal			-	3.236		0.770		1.473		-		1.473	-	-	N/A	
Management Services (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total				
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract	
Advanced Radar Threat Systems (PMA/A&AS)	Various	Various : Hill AFB, UT	-	3.741	May 2020	1.265	May 2021	2.050	May 2022	-		2.050	-	-	-	
Live Mission Operations Capability (LMOC) (PMA/A&AS)	Various	AFLCMC/XA : Hill AFB, UT	-	0.702	Feb 2020	-		0.100	Dec 2021	-		0.100	-	-	-	
P5 (PMA/A&AS)	Various	Various : Hill AFB, UT	-	0.150	Feb 2021	-		-		-		-	-	-	-	
Modernization Systems (PMA/A&AS)	Various	AFLCMC/XA : Hill AFB, UT	-	15.000	Jun 2020	-		-		-		-	-	-	-	
Modernization Systems (RTS) (PMA/A&AS)	Various	AFLCMC/XA : Hill AFB, UT	-	0.150	Apr 2020	0.289	Jun 2021	0.009	Oct 2021	-		0.009	-	-	-	
Subtotal			-	19.743		1.554		2.159		-		2.159	-	-	N/A	
Project Cost Totals			-	52.678		23.854		23.980		-		23.980	-	-	N/A	

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Air Force							Date: May 2021			
Appropriation/Budget Activity 3600 / 5			R-1 Program Element (Number/Name) PE 0604735F / <i>Combat Training Ranges</i>			Project (Number/Name) 652286 / <i>Combat Training Range Equipment</i>				
	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract	

Remarks
 FINANCIAL PERFORMANCE: Combat Training Ranges is evaluated against traditional Research and Development (R&D) program expenditure benchmarks. Unlike many traditional R&D programs, however, the ARTS-V2 development contract is an FPIF contract with progress payments. 20 percent of incurred costs are withheld until the end of the contract, when they are liquidated. Mandatory funding obligations and progress payment withholds will cause the program to lag traditional expenditure benchmarks, painting an inaccurate portrait of overall program health.

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Exhibit R-4, RDT&E Schedule Profile: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 0604735F / <i>Combat Training Ranges</i>	Project (Number/Name) 652286 / <i>Combat Training Range Equipment</i>
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	FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

Modernization Systems																												
-- Mini-MUTES B-PED Upgrade																												
Live Mission Operations Capability (LMOC)																												

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Exhibit R-4A, RDT&E Schedule Details: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 0604735F / <i>Combat Training Ranges</i>	Project (Number/Name) 652286 / <i>Combat Training Range Equipment</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
Combat Training Range Equipment				
P5CTS Development	1	2020	4	2022
-- P5 CTS GPS-Contested Training Operation Capability	1	2020	4	2022
Advanced Radar Threat System-Variant 1(ARTS-V1) EMD Phase	1	2020	1	2022
-- ARTS-V1 PRA Contract	1	2020	3	2021
-- ARTS-V1 DT-E and OT-E	3	2021	1	2022
-- ARTS-V1 Milestone C	2	2021	2	2021
Advanced Radar Threat System-Variant 2 (ARTS-V2) EMD Phase	1	2020	4	2021
-- ARTS-V2 PRA Contract	1	2020	4	2021
-- ARTS-V2 DT-E and OT-E	3	2020	3	2021
-- ARTS-V2 Milestone C	4	2021	4	2021
Advanced Radar Threat System-Variant 3 (ARTS-V3) System Spec Definition	1	2020	4	2021
-- ARTS-V3 Second Intel Assessment	2	2020	4	2021
-- ARTS-V3 Future Intel Assessment	2	2022	1	2024
-- ARTS-V3 Risk Reduction	1	2020	4	2022
-- ARTS-V3 PRA Development Decision	4	2022	4	2022
Advanced Radar Threat System-Variant 3 (ARTS-V3) Development	4	2022	1	2026
Advanced Radar Threat System-Variant 4 (ARTS-V4) Pre-milestone B	1	2020	1	2021
-- ARTS-V4 Milestone B	1	2024	1	2024
-- ARTS-V4 Development	1	2022	4	2024
Modernization Systems	1	2020	2	2020
-- Mini-MUTES B-PED Upgrade	3	2022	3	2024

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Exhibit R-4A, RDT&E Schedule Details: PB 2022 Air Force			Date: May 2021	
Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 0604735F / <i>Combat Training Ranges</i>	Project (Number/Name) 652286 / <i>Combat Training Range Equipment</i>		

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
Live Mission Operations Capability (LMOC)	1	2020	4	2022

Note
ARTS-V2: Please note, there are minor additional testing events in FY22 not listed under the sub-projects of the schedule.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force / BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 0604800F / F-35 - EMD
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COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
Total Program Element	0.000	7.420	5.413	0.000	0.000	0.000	-	-	-	-	-	-
653831: <i>Joint Strike Fighter</i>	0.000	7.420	5.413	0.000	0.000	0.000	-	-	-	-	-	-

Program MDAP/MAIS Code: 198

A. Mission Description and Budget Item Justification

The F-35 Joint Strike Fighter (JSF) Program will develop and field an affordable, highly common family of next generation strike aircraft for the USN, USAF, USMC and allies. The three variants are the F-35A Conventional Takeoff and Landing; F-35B Short Takeoff and Vertical Landing; and the F-35C Aircraft Carrier suitable variant. The F-35A will be a stealthy multi-role aircraft, primary air-to-ground for the Air Force to replace the F-16 and A-10 and complement the F-22. The F-35B variant will be a multi-role strike fighter aircraft to replace the AV-8B and F/A-18 for the Marine Corps, replace the Sea Harrier and GR 7 for the United Kingdom, and replace the AV-8 currently employed by the Italian Navy. The F-35C will provide the Department of the Navy a multi-role, stealthy strike fighter aircraft to complement the F/A-18E/F.

The United Kingdom, Italy, Netherlands, Canada, Australia, Denmark, Norway, and Foreign Military Sales customers are also participants in the JSF program. The program shown here reflects USN, USMC, USAF, and International Partner funding.

Funding at the accomplishment/planned program level is reported as the total of all services and partners as these activities support all aircraft variants.

The System Development and Demonstration (SDD) budget funds a total quantity of 20 RDT&E test articles to include 6 ground test articles and 14 flight test articles for USN, USAF, and USMC use.

- FY07: 1 F-35A flight test article
- FY08: 1 F-35B flight test article; 1 F-35B ground test article
- FY09: 1 F-35B flight test article; 2 F-35A ground test articles
- FY10: 6 flight test articles: 3 F-35A, 2 F-35B, 1 F-35C; 3 ground test articles: 1 F-35B, 2 F-35C
- FY11: 4 flight test articles: 1 F-35A, 1 F-35B, 2 F-35C
- FY13: 1 F-35C flight test article

This program is in Budget Activity 5, System Development and Demonstration (SDD) because it has passed Milestone B approval and is conducting engineering and manufacturing development tasks aimed at meeting validated requirements prior to full rate production.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force	Date: May 2021
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Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 0604800F / F-35 - EMD
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B. Program Change Summary (\$ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Previous President's Budget	7.628	5.423	0.000	0.000	0.000
Current President's Budget	7.420	5.413	0.000	0.000	0.000
Total Adjustments	-0.208	-0.010	0.000	0.000	0.000
• Congressional General Reductions	0.000	-0.010			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	0.000	0.000			
• Other Adjustments	-0.208	0.000	0.000	0.000	0.000

Change Summary Explanation

No significant Changes

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force										Date: May 2021		
Appropriation/Budget Activity 3600 / 5					R-1 Program Element (Number/Name) PE 0604800F / F-35 - EMD				Project (Number/Name) 653831 / Joint Strike Fighter			
COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
653831: <i>Joint Strike Fighter</i>	0.000	7.420	5.413	0.000	0.000	0.000	-	-	-	-	-	-
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

Note

Total cost for the United States Air Force (USAF) funding are: FY20 \$7.417M, FY21 \$5.413M, and FY22 \$0.000M. R-2 data reflects variant unique funding only.

R-2A(section B)/R-3 displays USAF funding only.

F-35 EMD Includes:

USAF PE 0604800F BPAC 653831

D&S Includes:

USAF PE 0604800F BPAC 653832

A. Mission Description and Budget Item Justification

The F-35 Joint Strike Fighter (JSF) Program will develop and field an affordable, highly common family of next generation strike aircraft for the USN, USAF, USMC and allies. The three variants are the F-35A Conventional Takeoff and Landing; F-35B Short Takeoff and Vertical Landing; and the F-35C Aircraft Carrier suitable variant. The F-35A will be a stealthy multi-role aircraft, primary air-to-ground for the Air Force to replace the F-16 and A-10 and complement the F-22. The F-35B variant will be a multi-role strike fighter aircraft to replace the AV-8B and F/A-18 for the Marine Corps, replace the Sea Harrier and GR 7 for the United Kingdom, and replace the AV-8 currently employed by the Italian Navy. The F-35C will provide the Department of the Navy a multi-role, stealthy strike fighter aircraft to complement the F/A-18E/F.

The United Kingdom, Italy, Netherlands, Canada, Australia, Denmark, Norway, and Foreign Military Sales customers are also participants in the JSF program. The program shown here reflects USN, USMC, USAF, and International Partner funding.

The top-line Program Element reflects the unique variant for each Service. Funding at the accomplishment/planned program level is reported as the total of all services and partners as these activities support all aircraft variants.

The System Development and Demonstration (SDD) budget funds a total quantity of 20 RDT&E test articles to include 6 ground test articles and 14 flight test articles for USN, USAF, and USMC use.

FY07: 1 F-35A flight test article

FY08: 1 F-35B flight test article; 1 F-35B ground test article

FY09: 1 F-35B flight test article; 2 F-35A ground test articles

FY10: 6 flight test articles: 3 F-35A, 2 F-35B, 1 F-35C; 3 ground test articles: 1 F-35B, 2 F-35C

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 0604800F / F-35 - EMD	Project (Number/Name) 653831 / Joint Strike Fighter

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
N/A					
FY 2022 OCO Plans: N/A					
Title: Development Support (F-35 JSF)	0.000	0.000	0.000	0.000	0.000
Description: SDD Support efforts for airframe, air vehicle systems, mission systems, weapons integration, mission support, and autonomic logistics development activities.					
FY 2021 Plans: N/A					
FY 2022 Base Plans: N/A					
FY 2022 OCO Plans: N/A					
Accomplishments/Planned Programs Subtotals	7.420	5.413	0.000	0.000	0.000
Other Service Funding Adjustment	0.000	0.000	0.000	0.000	0.000
Air Force Subtotals	7.420	5.413	0.000	0.000	0.000

C. Other Program Funding Summary (\$ in Millions)											
Line Item	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
• RDTE 05 0604800N 2261: JSF SDD (CV)	1.481	0.250	0.263	-	0.263	-	-	-	-	-	-
• RDTE 05 0604800N 2262: JSF SDD (STOVL)	1.710	0.561	0.580	-	0.580	-	-	-	-	-	-

Remarks
 This is a joint program with no executive service. Service Acquisition Execution (SAE) authority alternates between the Department of the Navy and the Department of the Air Force and currently resides with the Navy.

 Program Element 0604800N/0604800M continues USN development efforts budgeted in 0603800N prior to 2002.

 The United Kingdom, Italy, Netherlands, Canada, Australia, Denmark, and Norway are participants in the SDD phase of JSF.

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 0604800F / F-35 - EMD	Project (Number/Name) 653831 / Joint Strike Fighter

C. Other Program Funding Summary (\$ in Millions)

<u>Line Item</u>	<u>FY 2020</u>	<u>FY 2021</u>	<u>FY 2022</u> <u>Base</u>	<u>FY 2022</u> <u>OCO</u>	<u>FY 2022</u> <u>Total</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>FY 2026</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
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RELATED RDT&E: Funding prior to JSF SDD (FY94-FY01): USN PE 0603800N \$1,950.617M; USAF PE 0603800F \$1,907.352M; DARPA PE 0603800E \$118.056M; and International Partner contributions of \$253.921M for a total of \$4,229.946M.

D. Acquisition Strategy

The SDD program consists of a cost-reimbursement contract awarded to Lockheed Martin Aeronautics Company to develop the F-35 Air System, consisting of three aircraft variants and its associated logistics support system, for the U.S. Services and international participants. Similarly, a cost-reimbursement contract was awarded to Pratt & Whitney to develop the F135 propulsion system. Ground and flight testing will be conducted during development to accomplish validation and verification, with the extensive use of modeling and simulation to offset the risk of this large, complex, and concurrent lifecycle program. A comprehensive logistics support environment, including an integrated training system for aircrew, maintenance, and support personnel, is also being developed.

On 25 April 2011, the Department of Defense terminated the development of the General Electric Rolls-Royce Fighter Engine Team F136 propulsion system.

The F-35 Program has made international involvement a key element of the acquisition strategy. This includes international partnership in the development, production, and sustainment phases of the lifecycle. Additional international participation includes Foreign Military Sales arrangements.

In Fiscal Year (FY) 2007, separate cost-type contracts were awarded to Lockheed Martin Aeronautics Company and Pratt & Whitney to begin low rate initial production for F-35 air vehicles, propulsion systems, and sustainment for the fielded systems. Transition to fixed-price-type procurement contracts occurred with the fourth low rate lot. To provide logistics support for delivered aircraft, Performance-Based Logistics cost-type contracts will be awarded to Lockheed Martin Aeronautics Company and Pratt & Whitney.

At the completion of Low Rate Initial Production, a Defense Acquisition Board review, and Milestone Decision Authority approval, the F-35 Program will enter Full Rate Production. Fixed-price procurement contracts will be awarded for F-35 air vehicles and propulsion systems for the U.S. Services and international participants. Multiyear procurement authority for the F-35 Air System will be requested for Full Rate Production. Concurrently, multiple-year, fixed-price-type Performance Based Logistics contracts for sustainment will be requested to support multi-Service and multi-national requirements.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Air Force											Date: May 2021				
Appropriation/Budget Activity 3600 / 5						R-1 Program Element (Number/Name) PE 0604800F / F-35 - EMD					Project (Number/Name) 653831 / Joint Strike Fighter				

Product Development (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Product Development	C/CPAF	Not specified. : TBD	0.000	0.000		0.000		0.000		0.000		0.000	-	-	0.000
Lockheed Martin - SDD	SS/CPIF	Lockheed Martin : Ft. Worth, TX	0.000	7.420	Dec 2019	5.413	Dec 2020	0.000	Dec 2021	0.000	Dec 2021	0.000	-	-	32,495.150
Lockheed Martin - SDD Fee	SS/CPIF	Lockheed Martin : Ft. Worth, TX	0.000	0.000		0.000		0.000		0.000		0.000	-	-	1,754.193
Prior Year No Longer Funded in FYDP	Various	Various : TBD	0.000	0.000		0.000		0.000		0.000		0.000	-	-	0.000
Subtotal			0.000	7.420		5.413		0.000		0.000		0.000	-	-	N/A

Remarks

Contract type prior to 2013 was CPAF.
 Cumulative Award Fee earned in prior years for Lockheed Martin is 97%.
 Cumulative Award Fee earned in prior years for Pratt and Whitney is 98%.

	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Subtotals	0.000	7.420	5.413	0.000	0.000	0.000	-	-	N/A
Other Service Funding Adjustment	-	0.000	0.000	0.000	0.000	0.000			-
Project Cost Totals	0.000	7.420	5.413	0.000	0.000	0.000	0.000	0.000	-

Remarks

The project information shown here reflects USN, USMC, USAF and International Partner funding total for each contract. By agreement USN and USMC funding shares are approximately equal and when combined are equal to the USAF share.

NOTE 1: Prior Years reflect \$22,320.707M USAF
 FY 2020 reflects \$ 7.420M USAF
 FY 2021 reflects \$ 5.413M USAF
 FY 2022 reflects \$ 0.000M USAF

JSF EMD Includes:
 USAF PE 0604800F BPAC 653831

D&S Includes:
 USAF PE 0604800F BPAC 653832

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Exhibit R-4, RDT&E Schedule Profile: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 0604800F / F-35 - EMD	Project (Number/Name) 653831 / Joint Strike Fighter
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	FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

	FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
JSF Variants - CV, STOVL & CTOL																												
Acquisition Milestones: F-35C Initial Operational Capability																												
Test & Evaluation: Test and Evaluation: Initial Operational Test and Evaluation (IOT&E)																												
Defense Acquisition Reviews: System Development Reviews: Interim Program Review (IPR) FY18																												
Defense Acquisition Reviews: System Development Reviews: Interim Program Review (IPR) FY19																												
Defense Acquisition Reviews: System Development Reviews: Interim Program Review (IPR) FY20																												
Defense Acquisition Reviews: System Development Reviews: Interim Program Review (IPR) FY21																												
Production Lots (Full Funding / Production / Delivery: U.S. Aircraft): LOT 13 Full Funding / Production / Delivery																												
Production Lots (Full Funding / Production / Delivery: U.S. Aircraft): LOT 14 Full Funding / Production / Delivery																												
Production Lots (Full Funding / Production / Delivery: U.S. Aircraft): LOT 15 Full Funding / Production / Delivery																												
Production Lots (Full Funding / Production / Delivery: U.S. Aircraft): LOT 16 Full Funding / Production / Delivery																												

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Exhibit R-4, RDT&E Schedule Profile: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 0604800F / F-35 - EMD	Project (Number/Name) 653831 / Joint Strike Fighter
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	FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Production Lots (Full Funding / Production / Delivery: U.S. Aircraft): LOT 17 Full Funding / Production / Delivery																												
Production Lots (Full Funding / Production / Delivery: U.S. Aircraft): LOT 18 Full Funding / Production / Delivery																												
Production Lots (Full Funding / Production / Delivery: U.S. Aircraft): LOT 19 Full Funding / Production / Delivery																												
Production Lots (Full Funding / Production / Delivery: U.S. Aircraft): LOT 20 Full Funding / Production / Delivery																												

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Exhibit R-4A, RDT&E Schedule Details: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 0604800F / F-35 - EMD	Project (Number/Name) 653831 / Joint Strike Fighter
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Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
JSF Variants - CV, STOVL & CTOL				
Acquisition Milestones: F-35C Initial Operational Capability	2	2020	2	2021
Test & Evaluation: Test and Evaluation: Initial Operational Test and Evaluation (IOT&E)	1	2020	4	2020
Defense Acquisition Reviews: System Development Reviews: Interim Program Review (IPR) FY18	1	2020	1	2021
Defense Acquisition Reviews: System Development Reviews: Interim Program Review (IPR) FY19	1	2020	1	2020
Defense Acquisition Reviews: System Development Reviews: Interim Program Review (IPR) FY20	1	2021	1	2021
Defense Acquisition Reviews: System Development Reviews: Interim Program Review (IPR) FY21	1	2022	1	2022
Production Lots (Full Funding / Production / Delivery: U.S. Aircraft): LOT 13 Full Funding / Production / Delivery	2	2020	1	2021
Production Lots (Full Funding / Production / Delivery: U.S. Aircraft): LOT 14 Full Funding / Production / Delivery	2	2020	1	2021
Production Lots (Full Funding / Production / Delivery: U.S. Aircraft): LOT 15 Full Funding / Production / Delivery	2	2021	1	2022
Production Lots (Full Funding / Production / Delivery: U.S. Aircraft): LOT 16 Full Funding / Production / Delivery	2	2022	4	2023
Production Lots (Full Funding / Production / Delivery: U.S. Aircraft): LOT 17 Full Funding / Production / Delivery	2	2023	4	2024
Production Lots (Full Funding / Production / Delivery: U.S. Aircraft): LOT 18 Full Funding / Production / Delivery	2	2024	4	2025
Production Lots (Full Funding / Production / Delivery: U.S. Aircraft): LOT 19 Full Funding / Production / Delivery	2	2025	4	2025

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Exhibit R-4A, RDT&E Schedule Details: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 0604800F / F-35 - EMD	Project (Number/Name) 653831 / Joint Strike Fighter
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Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
Production Lots (Full Funding / Production / Delivery: U.S. Aircraft): LOT 20 Full Funding / Production / Delivery	2	2026	4	2026

Note
Schedule details reflect fiscal years

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force / BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 0604932F / <i>Long Range Standoff Weapon</i>
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COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
Total Program Element	1,216.497	701.866	384.727	609.042	0.000	609.042	-	-	-	-	-	-
657011: <i>LONG RANGE STAND-OFF</i>	1,216.497	701.866	384.727	609.042	0.000	609.042	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-	-	-

Program MDAP/MAIS Code: 489

A. Mission Description and Budget Item Justification

The Long Range Stand Off (LRSO) Cruise Missile is a long range survivable stand-off weapon capable of delivering lethal nuclear effect on strategic targets. LRSO will replace the currently fielded Air Launched Cruise Missile (ALCM) and will be integrated on both legacy and future bomber aircraft. The LRSO weapon system will be capable of penetrating and surviving advanced Integrated Air Defense Systems (IADS) from significant stand-off range to prosecute strategic targets in support of the Air Force's global attack capability and strategic deterrence core function.

Funds may be used to address emerging or short-notice Diminishing Manufacturing and Material Shortage (DMSMS) issues.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver weapon system capability. The use of such programs funds would be in addition to the civilian pay expenses budgeted in program element 0605831F.

This program is conducting activities associated with engineering and manufacturing development tasks aimed at meeting validated requirements during the Technology Maturation and Risk Reduction (TMRR) phase; transitioning through MS B decision point into EMD.

This program is in Budget Activity 5, System Development and Demonstration (SDD) because it has passed Milestone B approval and is conducting engineering and manufacturing development tasks aimed at meeting validated requirements prior to full rate production.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force	Date: May 2021
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Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force / BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 0604932F / <i>Long Range Standoff Weapon</i>
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B. Program Change Summary (\$ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Previous President's Budget	712.539	474.430	358.756	0.000	358.756
Current President's Budget	701.866	384.727	609.042	0.000	609.042
Total Adjustments	-10.673	-89.703	250.286	0.000	250.286
• Congressional General Reductions	0.000	-0.703			
• Congressional Directed Reductions	0.000	-89.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	-10.673	0.000			
• Other Adjustments	0.000	0.000	250.286	0.000	250.286

Change Summary Explanation

FY20 reduced 10.673M for Small Business Innovative Research (SBIR).

FY21 adjustments include Congressional Mark for TMRR funding excess to need -89,000; Undistributed Reduction - Excess to Need -703

FY22 increase to address LRSO requirements

C. Accomplishments/Planned Programs (\$ in Millions)	FY 2020	FY 2021	FY 2022
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Title: Long Range Stand-Off (LRSO) Weapon Development	624.386	310.149	496.451
Description: Conduct LRSO Weapon Development activities			
FY 2021 Plans: Continue to design, develop, integrate and test the LRSO system through the TMRR and EMD contracts. Robust systems engineering will ensure the USAF owns the technical baseline for requirements traceability as well as reliability, manufacturability, and maintainability. Program transitioning through MS B decision point into EMD.			
FY 2022 Plans: Program will continue to design, develop, integrate and test the LRSO system through the EMD contract. Specific areas of concentration will include qualification testing and nuclear hardness testing in support of component selection assessment. Continue sub-system critical design reviews in preparation for Critical Design Review, ensuring the design adequately meets the warfighter's performance requirements in the Capabilities Development Document (CDD). Robust systems engineering and early demonstrated flight testing will ensure the USAF owns the technical baseline for requirements traceability. Additional activities to			

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force		Date: May 2021		
Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 5: System Development & Demonstration (SDD)</i>		R-1 Program Element (Number/Name) PE 0604932F / <i>Long Range Standoff Weapon</i>		
C. Accomplishments/Planned Programs (\$ in Millions)		FY 2020	FY 2021	FY 2022
support reliability growth, manufacturability, and maintainability will also be conducted. The program will continue test activities, such as but not limited to, envelope testing, separation control testing and powered flight.				
FY 2021 to FY 2022 Increase/Decrease Statement: Funding increased due to ramp up in program activities for EMD.				
Title: All-Up-Round		39.323	43.101	73.109
Description: Conduct All-Up-Round activities to support weapon development				
FY 2021 Plans: Continue program practices that ensure the following are met: requirements flow down, requirement allocation to hardware and software, requirements compliance matrix, system performance, reliability, maintainability, product assurance, testability, producibility and supportability. Continue facility and security infrastructure upgrades to enable secure connectivity and communication between Department of Defense (DoD), Department of Energy (DOE), and industry. Continue efforts to conduct parallel development, design, and test activities with the DOE to ensure the LRSO adequately integrates the DOE designed warhead into the system. Conduct safety studies and other nuclear certification activities. Continue to perform Aircraft Integration efforts including activities associated with integration on threshold aircraft and aircraft mission planning system upgrades to accommodate the new weapon. Furthermore, these efforts include activities and assets related to weapon design compatibility and qualification, and other nuclear certification with both threshold and objective aircraft. Other activities falling under these efforts include: developing mission planning upgrade needs, OFP development and integration to deliver the OFP test tapes, planning activities necessary to integrate LRSO with aircraft, and ensuring the logical, electrical, and physical interfaces of the LRSO as defined in the ICD.				
FY 2022 Plans: Continue program practices that ensure the following are met: requirements flow down, requirement allocation to hardware and software, requirements compliance matrix, system performance, reliability, maintainability, product assurance, testability, producibility and supportability. Continue facility and security infrastructure upgrades to enable secure connectivity and communication between Department of Defense (DoD), Department of Energy (DOE), and industry. Continue efforts to conduct parallel development, design, and test activities with the DOE to ensure the LRSO adequately integrates the DOE designed warhead into the system. Conduct safety studies and other nuclear certification activities. Continue to perform Aircraft Integration efforts including activities associated with integration on threshold aircraft and aircraft mission planning system upgrades to accommodate the new weapon. Furthermore, these efforts include activities and assets related to weapon design compatibility and qualification, and other nuclear certification with both threshold and objective aircraft. Other activities falling under these efforts include: developing mission planning upgrade needs, OFP development and integration to deliver the OFP test tapes,				

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force	Date: May 2021
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Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force / BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 0604932F / <i>Long Range Standoff Weapon</i>
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C. Accomplishments/Planned Programs (\$ in Millions)	FY 2020	FY 2021	FY 2022
planning activities necessary to integrate LRSO with aircraft, and ensuring the logical, electrical, and physical interfaces of the LRSO as defined in the ICD. FY 2021 to FY 2022 Increase/Decrease Statement: Funding increased due to aircraft integration and W80-4 level of effort for EMD.			
Title: Test Support Description: Conduct Test Support activities to support weapon development FY 2021 Plans: Continue to perform design validation, verification, test, nuclear certification (to include design and operational certification) and system qualification activities. Perform weapon system environment testing. Furthermore, these efforts will continue test planning and execution activities to support LRSO weapon development, All-Up-Round technical integration, and aircraft integration. FY 2022 Plans: Continue to perform design validation, verification, test, nuclear certification (to include design and operational certification) and system qualification activities. Perform weapon system environment testing. Furthermore, these efforts will continue test planning and execution activities to support LRSO weapon development, All-Up-Round technical integration, and aircraft integration. FY 2021 to FY 2022 Increase/Decrease Statement: Funding increased due to ramp up in testing into EMD Phase.	38.157	31.477	39.482
Accomplishments/Planned Programs Subtotals	701.866	384.727	609.042

D. Other Program Funding Summary (\$ in Millions)
N/A

Remarks

E. Acquisition Strategy
The acquisition strategy focuses on the development and integration of subsystem technologies with a robust reliability and manufacturing approach in a competitive environment. The program obtained a successful MS A decision in July 2016 and subsequently released a Request for Proposals. The program competitively selected two prime contractors in August 2017 to execute the Technology Maturation and Risk Reduction (TMRR) phase. The selected prime contractors executed the Cost-Plus-Fixed-Fee (CPFF) contracts during TMRR with activities focused on developing and maturing subsystem and system designs. In FY20, LRSO pivoted to sole source TMRR contractor, enabling early Development RFP (dRFP) release & MS B. Program transitioning through MS B and early entry into EMD.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 0604932F / Long Range Standoff Weapon	Project (Number/Name) 657011 / LONG RANGE STAND-OFF
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Product Development (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Long Range Standoff Weapon Development	SS/CPFF	Various : TBD	946.766	590.780	Oct 2019	275.823	Oct 2020	453.203	Oct 2021	-		453.203	-	-	-
Subtotal			946.766	590.780		275.823		453.203		-		453.203	-	-	N/A

Support (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Aircraft Integration Planning	Various	Various : TBD	59.742	27.371	Jan 2020	25.182	Oct 2020	41.266	Oct 2021	-		41.266	-	-	-
All-Up-Round Activities	Various	Various : TBD	25.228	11.952	Feb 2020	17.919	Jan 2021	31.843	Jan 2022	-		31.843	-	-	-
Subtotal			84.970	39.323		43.101		73.109		-		73.109	-	-	N/A

Test and Evaluation (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Test Support	Various	Various : TBD	85.205	38.157	Jan 2020	31.476	Jan 2021	39.483	Jan 2022	-		39.483	-	-	-
Subtotal			85.205	38.157		31.476		39.483		-		39.483	-	-	N/A

Management Services (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Program Management Administration	Various	Various : TBD	99.556	33.606	Oct 2019	34.327	Oct 2020	43.247	Oct 2021	-		43.247	-	-	-
Subtotal			99.556	33.606		34.327		43.247		-		43.247	-	-	N/A

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Exhibit R-4, RDT&E Schedule Profile: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 0604932F / Long Range Standoff Weapon	Project (Number/Name) 657011 / LONG RANGE STAND-OFF

FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

Long Range StandOff Weapon	
Technology Maturation and Risk Reduction Phase	
Milestone B Decision	
Engineering and Manufacturing Development Phase	
CDR	

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Exhibit R-4A, RDT&E Schedule Details: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 0604932F / <i>Long Range Standoff Weapon</i>	Project (Number/Name) 657011 / <i>LONG RANGE STAND-OFF</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>Long Range StandOff Weapon</i>				
Technology Maturation and Risk Reduction Phase	1	2020	2	2022
Milestone B Decision	3	2021	3	2021
Engineering and Manufacturing Development Phase	3	2021	4	2026
CDR	2	2023	2	2023

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 0604933F / ICBM Fuze Modernization
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COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
Total Program Element	846.100	155.476	156.693	129.709	0.000	129.709	-	-	-	-	-	-
655082: <i>ICBM FUZE SUPPORT</i>	846.100	155.476	156.693	129.709	0.000	129.709	-	-	-	-	-	-
Quantity of RDT&E Articles	46	-	-	27	-	27	-	-	-	-	-	-

Program MDAP/MAIS Code: 0498

Note
 • Prior year RDT&E includes \$9.740M in PE 0604222F FY11 and \$39.717M in PE 0604851F FY12

A. Mission Description and Budget Item Justification

The Intercontinental Ballistic Missile (ICBM) Fuze Modernization Program is designing and developing a form, fit and functionally equivalent replacement for the Mk21 fuze that will provide a 30-year objective design life. The legacy Mk21 fuze is three times past its design life and ongoing Mk21 fuze refurbishment does not meet Nuclear Weapon Stockpile Plan requirements. The Mk21 reentry vehicle and fuze will be deployed on the current Minuteman III (MM III) and future Ground Based Strategic Deterrent (GBSD) Weapons Systems.

The US Air Force (USAF) will develop the Mk21 fuze using the NNSA complex, and the USAF weapons system integration contractor. The NNSA complex consists of Sandia National Labs-California [SNL-CA], Sandia National Labs-New Mexico [SNL-NM] and Kansas City National Security Campus [KCNSC], formerly Kansas City Plant. The ICBM Fuze Modernization program will leverage technologies, parts, components and development/production capabilities resulting from extensive fuze work performed by the US Navy (USN) and NNSA on the Mk5/W88 Alt 370 Fuze program. Common USN & USAF fuze components include the Radar Module, Thermal Battery Assembly and Path Length Module. USN & USAF fuze components that are partially common and use common technologies include the Missile Interface and Controller Module, Launch Safety Device, Firing Set Integration Module and Terminal Protection Device.

The ICBM Fuze Modernization Program will integrate the replacement fuze into MM III and the future GBSD weapon systems, to include support/test equipment, data, flight test hardware, and training materials. The program will also conduct required system testing (including ground and flight tests). The program is coordinating Mk21 fuze replacement development efforts with the DOE to synchronize USAF arming and fuze development activities with DOE warhead requirements. When prudent, the program will conduct trade studies and initiate conceptual designs to address operational system issues and meet future requirements.

As a cooperative USAF, USN and NNSA acquisition, the USAF is executing the program using Department of Defense (DoD)-DOE Manual 5030.55 Joint Nuclear Weapons Life Cycle Activities (Phase 6.X process) while meeting Major Defense Acquisition Program (MDAP) statutory requirements.

The ICBM Fuze Modernization Program was rebaselined and the Arming and Fuzing Assembly completed Final Design Review in Fiscal Year 2020. An updated Service Cost Position was approved in July 2020. The Fiscal Year 2022 budget submission accounts for the rebaselined position.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force	Date: May 2021
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Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 0604933F / <i>ICBM Fuze Modernization</i>
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The Fiscal Year 2022 budget request continues cooperative efforts with the USN to leverage common components; conduct qualification tests; and continue development of lab, ground, and flight test assets. This program also includes any needed nuclear surety and certification and system vulnerability assessments.

This program element may include necessary emergent or unanticipated civilian pay expenses required to manage, execute, and deliver ICBM Fuze Modernization for emergent or unanticipated weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program elements 0605833F or 0605831F.

This program entered Phase 6.4 "Production Engineering" of the 6.X process Jan 2019. The program will conduct production engineering tasks aimed at meeting validated requirements prior to Phase 6.5.

This program is in Budget Activity 5, System Development and Demonstration (SDD) because it has passed Milestone B approval and is conducting engineering and manufacturing development tasks aimed at meeting validated requirements prior to full rate production.

B. Program Change Summary (\$ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Previous President's Budget	161.199	167.099	104.657	0.000	104.657
Current President's Budget	155.476	156.693	129.709	0.000	129.709
Total Adjustments	-5.723	-10.406	25.052	0.000	25.052
• Congressional General Reductions	0.000	-0.286			
• Congressional Directed Reductions	0.000	-10.120			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	-5.723	0.000			
• Other Adjustments	0.000	0.000	25.052	0.000	25.052

Change Summary Explanation

FY2020 funding reflects a Small Business Innovation Research (SBIR) adjustment of 5.723 million.

FY2021 funding reflects a Congressional Directed Reduction of 10.120 million for "Forward Financing" and a Congressional General Reduction of 0.286 million for an undistributed mark.

FY2022 funding reflects an increase in accordance with the latest service cost position.

C. Accomplishments/Planned Programs (\$ in Millions)	FY 2020	FY 2021	FY 2022
Title: Fuze Design and Development	147.826	139.293	110.177

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force		Date: May 2021		
Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 5: System Development & Demonstration (SDD)</i>		R-1 Program Element (Number/Name) PE 0604933F / <i>ICBM Fuze Modernization</i>		
C. Accomplishments/Planned Programs (\$ in Millions)		FY 2020	FY 2021	FY 2022
<p>Description: Design and develop the Mk21 fuze required to support the ICBM W87 warhead. Coordinate design and development efforts with the ICBM weapon system integrator and support flight testing.</p> <p>FY 2021 Plans:</p> <ul style="list-style-type: none"> • Finish and release Joint Test Assembly (JTA) 4a drawings • Finish and release Arming and Fuzing Assembly (AFA) drawings • Conduct Ground Test Unit 3 (GTU-3) test activities • Conduct JTA 4a High-Fidelity development test • Conduct Process Prove In (PPI) mechanical environmental tests • Conduct PPI thermal environments, cumulative damage, and radiation tests • Continue AFA large and small core material compatibility testing • Conduct Milestone C Review <p>FY 2022 Plans:</p> <ul style="list-style-type: none"> • Conduct Flight Test Unit 3 testing and activities • Conduct Mass Properties Test • Conduct Mechanical Environments qualification • Conduct Hostile Shock qualification • Conduct Susceptibility Test • Conduct Cumulative Effects Test (Radiated Susceptibility and Thermal Cycle plus mechanical & electrical tests) • Conduct Radiation Test Qualification • Conduct Mass Properties testing for Trainers • Conduct Handling Environment testing for Trainers • Conduct Accumulated Damage Testing on the Storage Environment for Trainers • Conduct Shock/Vibe testing in the transportation environment for Trainers • Further develop analytical, information technology, and data management capabilities. <p>FY 2021 to FY 2022 Increase/Decrease Statement: Funding decreased due to ramp down of development efforts in preparation for production.</p>				
<p>Title: Weapon System Integration/Systems Engineering</p> <p>Description: Integrate the Mk21 fuze into the Intercontinental Ballistic Missile weapon system. Validate designs through ground tests on an Integrated Test Bed (ITB). Plan and conduct necessary ground and flight testing. Coordinate design, development and test efforts.</p>		7.650	17.400	19.532

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 0604933F / ICBM Fuze Modernization
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C. Accomplishments/Planned Programs (\$ in Millions)	FY 2020	FY 2021	FY 2022
<i>FY 2021 Plans:</i> <ul style="list-style-type: none"> • Conduct Electrical Compatibility Test 3 • Conduct JTA4a Pathfinder Testing • Continue Basic Nuclear Safety Assessment Report updates • Continue Nuclear Surety Evaluation Report updates • Continue ICBM Compatibility Certification Report updates • Conduct Final Special Safety Study • Validate Technical Order updates • Execute and conduct RV level post test analysis of Flight Test 2 • Support Ground Test Unit 3 (GTU-3) test activities 			
<i>FY 2022 Plans:</i> <ul style="list-style-type: none"> • Continue Basic Nuclear Safety Assessment Report updates • Continue Nuclear Surety Evaluation Report updates • Continue ICBM Compatibility Certification Report updates • Support Flight Test Unit 3 testing and activities • Validate Technical Order updates • Chair Survivability Task Team (STT) • Perform Comparative Analysis • Operate & Maintain ITB Fuze System Tester 			
<i>FY 2021 to FY 2022 Increase/Decrease Statement:</i> Funding increased due to the program entering qualification testing, continued nuclear and compatibility certification efforts, and additional tasks to augment SPO engineering support.			
Accomplishments/Planned Programs Subtotals	155.476	156.693	129.709

D. Other Program Funding Summary (\$ in Millions)											
<u>Line Item</u>	<u>FY 2020</u>	<u>FY 2021</u>	<u>FY 2022</u> <u>Base</u>	<u>FY 2022</u> <u>OCO</u>	<u>FY 2022</u> <u>Total</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>FY 2026</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• MPAF 03 M30FLH: <i>ICBM FUZE MOD</i>	14.497	43.450	100.770	-	100.770	-	-	-	-	-	-
• RDTE 04 0605230F: <i>Ground Based Strategic Deterrent</i>	538.643	1,447.113	2,553.541	-	2,553.541	-	-	-	-	-	-
• MPAF 01 MGBSD0: <i>GBSD</i>	0.000	0.000	10.895	-	10.895	-	-	-	-	-	-

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force	Date: May 2021
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Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 0604933F / <i>ICBM Fuze Modernization</i>
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D. Other Program Funding Summary (\$ in Millions)

<u>Line Item</u>	<u>FY 2020</u>	<u>FY 2021</u>	<u>FY 2022</u> <u>Base</u>	<u>FY 2022</u> <u>OCO</u>	<u>FY 2022</u> <u>Total</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>FY 2026</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• RDTE 07 0101328F: <i>ICBM Reentry Vehicles</i>	63.484	112.547	96.313	-	96.313	-	-	-	-	-	-

Remarks

E. Acquisition Strategy

The ICBM Fuze Modernization program is executing a full cost reimbursable work-for-others agreement with the NNSA complex using SNL as the design agent and KCNSC as the production agent. The program is a collaborative effort with the USN reducing total program cost and development time by leveraging commonality between the ICBM and Submarine Launched Ballistic Missile fuze components. The USN Mk5 Alt 370 fuze is being developed first, with the USAF Mk21 fuze effort following. Both services participate in all design and development efforts to ensure maximum use of common components, subassemblies and technologies. Both services are using NNSA/SNL to perform fuze design and development. The USAF, as lead systems integrator for the Mk21 fuze, competed a separate weapon system integration contract for integration support to assist the government with MM III unique modifications and fuze integration efforts. Both services are using KCNSC to produce fuzes.

Due to the differences between the Department of Energy and the Department of Defense acquisition processes, the program has decoupled Milestone C from Phase 6.5 and Full Rate Production from Phase 6.6. The program is forecasted to complete a Milestone C decision in 4QFY2021 and a Full Rate Production Decision in 2QFY2024.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 0604933F / ICBM Fuze Modernization	Project (Number/Name) 655082 / ICBM FUZE SUPPORT
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Product Development (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Fuze Preliminary Design Development	MIPR	Sandia National Labs : Albuquerque, NM	529.936	77.371	Nov 2019	59.452	Nov 2020	50.938	Nov 2021	-		50.938	-	-	782.461
Fuze EMD	Various	Various : Various	3.203	1.020	Nov 2019	7.746	Nov 2020	4.659	Nov 2021	-		4.659	-	-	22.845
Fuze Engineering Change Orders	Various	Various : Various	7.431	1.300	May 2020	3.441	May 2021	2.709	Nov 2021	-		2.709	-	-	18.496
Fuze National Security Campus (formerly Kansas City Plant)	MIPR	National Security Campus : Kansas City, MO	132.648	60.827	Nov 2019	63.191	Nov 2020	47.466	Nov 2021	-		47.466	-	-	365.663
Fuze Weapon System Integration - ICBM Prime	C/CPAF	Northrop Grumman : Clearfield, UT	25.937	-		-		-		-		-	-	-	25.937
Fuze Weapon System Integration - RS/RV Sub-System Contract (SSC)	C/CPAF	Lockheed Martin : Valley Forge, UT	84.691	-		-		-		-		-	-	-	84.691
RS/RV Sub-System Contract (SSC)	C/CPFF	Lockheed Martin : Valley Forge, PA	0.000	7.650	Jan 2020	17.400	Jan 2021	19.532	Jan 2022	-		19.532	-	-	70.645
Subtotal			783.846	148.168		151.230		125.304		-		125.304	-	-	N/A

Support (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Fuze Engineering Support - BAH	C/FP	Booz Allen Hamilton : Clearfield, UT	2.757	-		-		-		-		-	-	-	2.757
Fuze Engineering Support - BAE	C/FFP	BAE : Clearfield, UT	13.741	1.390	Jul 2020	1.675	Jul 2021	1.225	Nov 2021	-		1.225	-	-	23.415
Subtotal			16.498	1.390		1.675		1.225		-		1.225	-	-	N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 0604933F / ICBM Fuze Modernization	Project (Number/Name) 655082 / ICBM FUZE SUPPORT
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Test and Evaluation (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Fuze Lead Project Office Support	MIPR	AFNWC : Albuquerque, NM	10.480	-		-		-		-		-	-	-	10.480
Fuze Finite Element Model Validation	C/CPFF	LMTF : Little Mountain, UT	1.843	-		-		-		-		-	-	-	1.843
Fuze Flight Test Support and Evaluation	Various	Various : Various	5.650	4.884	Feb 2020	-		-		-		-	-	-	10.534
Subtotal			17.973	4.884		-		-		-		-	-	-	N/A

Management Services (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Fuze Cost and Financial Management	C/FFP	Tecelote : Salt Lake City, UT	5.157	-		-		-		-		-	-	-	5.157
Fuze FFRDC Support	MIPR	Aerospace : Los Angeles, CA	6.223	0.680	Dec 2019	0.780	Nov 2020	0.780	Nov 2021	-		0.780	-	-	9.997
Fuze Program Support	C/FFP	BAE : Clearfield, UT	1.285	0.000	Jul 2020	-		-		-		-	-	-	1.285
Fuze Program Management Administration	Various	Various : Various	15.118	0.354	Jul 2020	3.008	Jul 2021	2.400	Nov 2021	-		2.400	-	-	23.735
Subtotal			27.783	1.034		3.788		3.180		-		3.180	-	-	N/A

	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals		846.100	155.476	156.693	129.709	-	-	-	N/A

Remarks
 Prior year RDT&E includes \$9.740M in PE 0604222F FY11 and \$39.717M in PE 0604851F FY12

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Exhibit R-4, RDT&E Schedule Profile: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 0604933F / ICBM Fuze Modernization	Project (Number/Name) 655082 / ICBM FUZE SUPPORT
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	FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

AF ICBM Fuze Modernization Program	
Engineering and Manufacturing Development	
Flight Test 2 (Feb 2020)	
Final Design Review [FDR] (Aug 2020)	
Complete Engineering Release (Oct 2020)	
Milestone C Review (Aug 2021)	
Production and Deployment	
Flight Test 3 (Aug 2022)	
Production Readiness Review (Jan 2023)	
Flight Test 4 (Feb 2024)	
Full Rate Production Decision (Mar 2024)	
DOE Phase 6.5 Milestone Decision (May 2024)	
First Production Unit (May 2024)	
Initial Operating Capability (Feb 2025)	
DOE Phase 6.6 Milestone Decision (May 2025)	

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Exhibit R-4A, RDT&E Schedule Details: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 0604933F / ICBM Fuze Modernization	Project (Number/Name) 655082 / ICBM FUZE SUPPORT

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
AF ICBM Fuze Modernization Program				
Engineering and Manufacturing Development	1	2020	2	2023
Flight Test 2 (Feb 2020)	2	2020	2	2020
Final Design Review [FDR] (Aug 2020)	4	2020	4	2020
Complete Engineering Release (Oct 2020)	1	2021	1	2021
Milestone C Review (Aug 2021)	4	2021	4	2021
Production and Deployment	4	2021	4	2026
Flight Test 3 (Aug 2022)	4	2022	4	2022
Production Readiness Review (Jan 2023)	2	2023	2	2023
Flight Test 4 (Feb 2024)	2	2024	2	2024
Full Rate Production Decision (Mar 2024)	2	2024	2	2024
DOE Phase 6.5 Milestone Decision (May 2024)	3	2024	3	2024
First Production Unit (May 2024)	3	2024	3	2024
Initial Operating Capability (Feb 2025)	2	2025	2	2025
DOE Phase 6.6 Milestone Decision (May 2025)	3	2025	3	2025

Note

The ICBM Fuze Mod Program discovered the need to de-couple Milestone C and Full Rate Production (FRP) from Phase 6.5 and Phase 6.6 respectively. At the time of the initial baseline in 2014, Phase 6.5 and Phase 6.6 were selected as the surrogates for the DoD milestones. Since that time differences between the DOE Phase 6.x process and the DoD 5000, as it relates to funding of Title 10 programs, have drove a de-coupling of these milestones into the Acquisition Program Baseline. This program is still being managed according to the Phase 6.x process but Milestone C and FRP have been added as milestones that will be accomplished to satisfy statutory requirements of a Title 10 funded acquisition.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 0605030F <i>I Joint Tactical Network Center (JTNC)</i>
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COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
Total Program Element	-	2.326	0.000	0.000	0.000	0.000	-	-	-	-	-	-
655068: <i>Joint Tactical Radio System (JTRS)</i>	-	2.326	0.000	0.000	0.000	0.000	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-	-	-

Note

Joint Tactical Networking Center (JTNC) is funded using a Joint budget strategy. Each Military Department (MILDEP) budgets for approximately one-third of the total program RDT&E requirements for joint efforts. Out-year funding is programmed in PE 0605030A by the Army, PE 0605030N by the Navy and PE 0605030F by the Air Force. Prior to submission of the President's Budget, the funding is consolidated in PE 0605030A via Resource Management Decision (RMD) for execution.

A. Mission Description and Budget Item Justification

This funding line supports the Army Network Modernization Strategy LOE 1, Unified Network. Efforts are aligned to support the Network-Cross Functional Team capability set approach to achieve the network modernization strategy.

The JTNC is chartered to enable the DoD's rapid identification, characterization, procurement, fielding, and sustainment of modular, innovative tactical communications products that ensure secure, interoperable, and resilient C4ISR capabilities. The JTNC provides technical expertise to facilitate tactical communications management, innovation, and standardization. The JTNC: (1) maintains a cyber-hardened DoD Information Repository (IR), (2) provides Technical Analyses/Capability Characterizations on tactical communications products, (3) provides Open Systems Architecture Standards, (4) exportability analysis and licensing reviews, and (5) serves as Technical Advisor to the C3LB and Tactical Communications Senior Steering Group (TCSSG).

JTNC mission is executed in coordination with key government stakeholders to include: C3LB, TCSSG, Communications Technologies and Waveforms Working Group (CTWWG), Department of DoD CIO, USD A&S, Joint Staff J6 (JS J6), USD R&E, and the Services. Particular attention is paid to ensuring that interagency work is collaborative and eliminates duplicative capability. The JTNC enables a common software baseline that is hardware agnostic leading to increased competition for Software Defined Radios (SDR).

Through collaboration with DoD matrixed and industry partners, the JTNC is engaged in the analysis of directed software and artifacts, and support of the National Security Agency (NSA) Commercial Communications Security (COMSEC) Evaluation Program (CCEP). Additionally, the JTNC participates in Standards-related activities such as the Interface Control Working Group (ICWG), and continues evolving its Capabilities Characterization and Joint Communications Marketplace (CC & JCM) and Modular Radio Architecture (MRA) processes. Further JTNC directed requirements outlined by the C3LB consist of CTWWG and FY20 NDAA acquisition support, Joint All-Domain Command and Control (JADC2), continued development/maturation of the DoD IR framework and eventual Cloud migration, JCM Development to meet DoD and Industry requirements in conjunction with the FY20 NDAA Section 168.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force	Date: May 2021
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Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 0605030F / <i>Joint Tactical Network Center (JTNC)</i>
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This program element may include necessary civilian pay expenses required to manage, execute, and deliver weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program element 0605030F. In FY19 (0) and FY20 (0) was expended for civilian pay expenses in this program element.

This program is in Budget Activity 5, System Development and Demonstration (SDD) because it has passed Milestone B approval and is conducting engineering and manufacturing development tasks aimed at meeting validated requirements prior to full rate production.

B. Program Change Summary (\$ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Previous President's Budget	2.414	0.000	8.340	0.000	8.340
Current President's Budget	2.326	0.000	0.000	0.000	0.000
Total Adjustments	-0.088	0.000	-8.340	0.000	-8.340
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	0.000	0.000			
• Other Adjustments	-0.088	0.000	-8.340	0.000	-8.340

Change Summary Explanation

FY22 - prior to the year of execution, funds are consolidated from Air Force, (PE 0605030F) into Army (0605030A) via Resource Management Decision (RMD) for execution.

C. Accomplishments/Planned Programs (\$ in Millions)	FY 2020	FY 2021	FY 2022
Title: Joint Tactical Networking Center (JTNC)	2.326	0.000	0.000
Description: Joint Tactical Networking Center (JTNC) aligns with the Communications, Command, and Control Leadership Board (C3LB), DoD Chief Information Officer (CIO), Joint Staff, the Services, and other key stakeholders for those JTNC chartered processes that ensure secure, interoperable, and resilient tactical communications. The JTNC: (1) maintains a cyber-hardened DoD Information Repository (IR), (2) provides Technical Analyses/Capability Characterizations on tactical communications products, (3) provides Open Systems Architecture Standards, (4) exportability analysis and licensing reviews, and (5) serves as Technical Advisor to the JTNC Board of Directors (BoD).			
FY 2021 Plans:			

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force	Date: May 2021
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Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 0605030F <i>I Joint Tactical Network Center (JTNC)</i>
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C. Accomplishments/Planned Programs (\$ in Millions)	FY 2020	FY 2021	FY 2022
Funding aligned to PE 0605030A.			
<i>FY 2022 Plans:</i> Funding aligned to PE 0605030A.			
<i>FY 2021 to FY 2022 Increase/Decrease Statement:</i> N/A			
Accomplishments/Planned Programs Subtotals	2.326	0.000	0.000

D. Other Program Funding Summary (\$ in Millions)

N/A

Remarks

The Joint Tactical Networking Center is funded by all the Services. The Joint Funding Strategy requires each of the three Service Military Departments (MILDEPs) to budget for one-third of the total program approved requirement. Other funding is as follows:

Army RDTE: 0605030A, FY 2022 16,697 // FY 2023 5,485 // FY 2024 5,842 // FY 2025 5,947 // FY 2026 5,947
 Navy RDTE: 0605030N, 3077. FY 2022 0 // FY 2023 5,130 // FY 2024 5,251 // FY 2025 5,366 // FY 2026 5,474

Due to Joint Funding Strategy, there is no prior year funding for JTNC in the other Service lines. The JTNC funding is consolidated in Army PE 0605030A for execution.

E. Acquisition Strategy

The Joint Tactical Networking Center (JTNC) is a Joint support program to the Services, the DoD Chief Information Officer (CIO), the Under Secretary of Defense for Acquisition and Sustainment (USD(A&S)), and USD Research and Engineering (USD(R&E)). JTNC core functions as defined in the JTNC Acquisition Decision Memorandum and Charter signed on 20 January 2014 and revalidated on 13 September 2019 include execution in the following areas: Information Repository, Technical Analysis, Open Systems Architecture Standards, Exportability Analysis and Licensing Review, and Technical Advisor to the C3LB. The services derived from these core functions reinforce an acquisition environment which ensures that interoperable, secure, and resilient joint tactical waveforms and wireless communications applications can operate in a variety of hardware transport solutions.

The FY22 Budget supports continued development/maturation of the DoD IR, analysis of directed software and artifacts, support of the National Security Agency (NSA) Commercial Communications Security (COMSEC) Evaluation Program (CCEP), JTNC Standards Interface Control Working Group (ICWG), the Capabilities Characterization and Joint Communications Marketplace (CC & JCM). The FY22 budget supports the Lead Service Initiative where JTNC will serve as a technical advisor and source of engineering and analytic resources in the conduct of Joint enterprise-level systems engineering and analysis and support DoD CIO. The FY22 budget supports the continued management of Joint warfighter challenges and solutions as assigned by the TCSSG. The FY22 budget supports Modular Radio

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 0605030F / <i>Joint Tactical Network Center (JTNC)</i>
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Architecture (MRA) work, where JTNC will lead development and promulgation of a framework containing a collection of DoD standards and a description or architecture of how to use these to compose or control a communications system. The MRA defines how to implement a communications system or radio on select platforms.

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Exhibit R-4, RDT&E Schedule Profile: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 0605030F / Joint Tactical Network Center (JTNC)	Project (Number/Name) 655068 / Joint Tactical Radio System (JTRS)

FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

JTNC - Compliance and Certification	
Waveform and Wireless Product Compliance and Certification	████████████████████
JTNC - Information Repository	
DoD Waveform Information Repository	████████████████████
JTNC - Standards	
Evolve Waveform Standards and SCA	████████████████████
JTNC - Analysis	
Analyze Waveforms and Associated Artifacts	████████████████████

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Exhibit R-4A, RDT&E Schedule Details: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 0605030F / <i>Joint Tactical Network Center (JTNC)</i>	Project (Number/Name) 655068 / <i>Joint Tactical Radio System (JTRS)</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>JTNC - Compliance and Certification</i>				
Waveform and Wireless Product Compliance and Certification	1	2021	4	2022
<i>JTNC - Information Repository</i>				
DoD Waveform Information Repository	1	2021	4	2022
<i>JTNC - Standards</i>				
Evolve Waveform Standards and SCA	1	2021	4	2022
<i>JTNC - Analysis</i>				
Analyze Waveforms and Associated Artifacts	1	2021	4	2022

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 0605056F / <i>Open Architecture Management</i>
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COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
Total Program Element	-	28.902	30.491	37.109	0.000	37.109	-	-	-	-	-	-
656060: <i>Standards Management</i>	-	28.902	30.491	37.109	0.000	37.109	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-	-	-

A. Mission Description and Budget Item Justification

The Open Architecture Management (OAM) Office (OAMO) at the Air Force Life Cycle Management Center is responsible for developing, evolving, and managing open standards. Open standards permit Department of Defense programs to reduce acquisition and life-cycle costs as well as the risks associated with development, sustainment, technology refresh, and capability upgrades of mission systems on weapon systems. The OAMO continues to manage the Open Mission Systems (OMS) and the Universal Command and Control (C2) Interface (UCI) Standards. Additionally, the OAMO will continue working activities for other standards and open architecture initiatives to transition to OAMO management/ownership.

OAMO provides funding to multiple entities, including the Air Force Research Laboratory (AFRL), the 76th Software Engineering Group (76 SWEG), defense contractors, Federally Funded Research and Development Centers, and University Affiliated Research Centers in support of standards management activities. AFRL is responsible for executing science and technology initiatives to further develop the OMS/UCI Standards. The 76 SWEG is responsible for key activities and deliverables for the OMS and UCI standards including: managing a collaborative tools environment, updating tools in the OMS/UCI Starter Kit, updating the Government critical abstraction layer, maintaining the Reference Implementation, integrating and testing the Mission Package, completing Change Package Development and Sponsorship, supporting the OMS and UCI management activities, providing support to adopting programs, and providing training and associated documentation. These entities will also be funded to support activities for other standards or open architecture initiatives to transition to OAMO management/ownership.

The OAMO will begin development/maintenance of the Government Avionics Reference Architecture (GARA), an Avionics Model Based Systems Engineering (MBSE) environment for conducting automated evaluations, trade studies, and implementation of open standards.

The OAMO will execute P3I initiatives as required and include activities such as specifically targeted improvements to open standards and open architecture initiatives, coordination with other standardization efforts, enhancements (including cybersecurity, as required), and widening the applicability of the standards the OAMO is involved with.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver open standards capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program elements 0605826F, 0605827F, 0605829F, 0605830F, 0605831F, 0605832F, 0605898F, and 0605833F.

This program is in Budget Activity 5, System Development and Demonstration (SDD) because it has passed Milestone B approval and is conducting engineering and manufacturing development tasks aimed at meeting validated requirements prior to full rate production.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force	Date: May 2021
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Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 0605056F / <i>Open Architecture Management</i>
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B. Program Change Summary (\$ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Previous President's Budget	30.000	30.547	31.165	0.000	31.165
Current President's Budget	28.902	30.491	37.109	0.000	37.109
Total Adjustments	-1.098	-0.056	5.944	0.000	5.944
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	0.000	0.000			
• Other Adjustments	-1.098	-0.056	5.944	0.000	5.944

Change Summary Explanation

FY 2022 increased due to realignment from PE 0604414F Weapon Systems Cyber Resiliency to the Open Architecture Management PE to more appropriately align open standards initiatives. This improves congressional transparency. FY 2020 and FY 2021 differences due to standard taxes, inflationary adjustments, etc.

C. Accomplishments/Planned Programs (\$ in Millions)	FY 2020	FY 2021	FY 2022
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Title: Open Architecture Management Office	28.902	30.491	37.109
Description: Accomplish all industry activities that result in the annual release of the OMS and UCI standards along with the associated documentation, including training materials. Manage government activities to support the OMS and UCI Standards. Accomplish industry and government activities to support other open standards and open architecture initiatives managed by the OAMO. Conduct preplanned activities to add additional capability and evolve standards and open architecture initiatives managed and supported by the OAMO.			
FY 2021 Plans: Continue to modify and update the existing OMS and UCI standards to widen the pool of OMS/UCI applicability, account for emerging technologies, adjust for program specific needs, and conduct targeted training. In coordination with industry partners develop annual releases of the OMS/UCI standards, develop training and implementation materials, and conduct quarterly common governance boards. Provide government expertise to support standards development efforts. Continue working transition activities for other standards, as required. Develop an annual starter kit, update tool kits, perform testing and integration activities, assist in the generation and modification of an Anti-Tamper (AT) interface control document, and conduct other management and development activities. Ensure development of the standard incorporates cybersecurity considerations including			

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force	Date: May 2021
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Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 0605056F / <i>Open Architecture Management</i>
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C. Accomplishments/Planned Programs (\$ in Millions)	FY 2020	FY 2021	FY 2022
<p>message/data transfer security, cyber risk mitigation, and implementation standardization. Conduct other P3I initiatives, such as specifically targeted improvements to the standards, and coordination with other standardization efforts.</p> <p>FY 2022 Plans: Continue to modify and update the existing OMS and UCI Standards to widen the pool of OMS/UCI applicability, account for emerging technologies, adjust for program specific needs, and conduct targeted training. In coordination with industry partners and government agencies, complete all activities (including quarterly common governance boards) to develop annual releases of the OMS/UCI Standards. Provide government expertise to support open standards and open architecture development efforts. Work activities to advance, modify, or transition to OAMO ownership/management of other open standards and open architecture initiatives, as required. Develop starter kits, tool kits (including required updates), perform testing and integration activities, assist in the generation and maintenance of anti-tamper and cybersecurity documentation, and conduct other management and development activities, as required. Conduct P3I initiatives, such as specifically targeted improvements to the standards in coordination with other standardization efforts. Fund efforts to develop the open architecture initiatives including the Government Avionics Reference Architecture (GARA). Fund Sensor Open Systems Architecture (SOSA) hardware initiatives.</p> <p>FY 2021 to FY 2022 Increase/Decrease Statement: FY 2022 increased compared to FY 2021 by 0.603 million. Increase is due to realignment from the Weapon System Cyber Resilience 0604414F PE to Open Architecture Management to realign open standards initiatives into one PE. This improves congressional transparency.</p>			
Accomplishments/Planned Programs Subtotals	28.902	30.491	37.109

D. Other Program Funding Summary (\$ in Millions)

N/A

Remarks

E. Acquisition Strategy

The Air Force Life Cycle Management Center's OAMO awarded a follow-on contract to continue the standards management activities conducted under a previously classified Air Force RDT&E Program Element. The contract is a cost plus fixed fee (CPFF) indefinite delivery/indefinite quantity (ID/IQ) that was awarded in December 2018. The first delivery order has a period of performance of 3 years beginning 1 January 2019. A second delivery order with a one-year period of performance will be awarded in first quarter of FY2021 to cover the period 1 January 2022 through 31 December 2022. An acquisition strategy is being worked.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 0605056F / <i>Open Architecture Management</i>	Project (Number/Name) 656060 / <i>Standards Management</i>
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Product Development (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Open Architecture Collaborative Working Group - BAE Systems	SS/CPFF	BAE Systems : Nashua, NH	-	1.144	Jan 2020	1.225	Dec 2020	1.135	Dec 2021	-		1.135	-	-	-
Open Architecture Collaborative Working Group - Boeing	SS/CPFF	Boeing : St. Louis, MO	-	4.145	Jan 2020	4.180	Dec 2020	4.178	Dec 2021	-		4.178	-	-	-
Open Architecture Collaborative Working Group - General Atomics ASI	SS/CPFF	General Atomics ASI : Poway, CA	-	1.088	Jan 2020	1.152	Dec 2020	1.081	Dec 2021	-		1.081	-	-	-
Open Architecture Collaborative Working Group - Collins Aerospace	SS/CPFF	Collins Aerospace : Westford, MA	-	1.204	Jan 2020	1.168	Dec 2020	1.075	Dec 2021	-		1.075	-	-	-
Open Architecture Collaborative Working Group - Harris Corp	SS/CPFF	Harris Corp : Clifton, NJ	-	1.274	Jan 2020	1.320	Dec 2020	1.254	Dec 2021	-		1.254	-	-	-
Open Architecture Collaborative Working Group - Lockheed Martin	SS/CPFF	Lockheed Martin : Fort Worth, TX	-	6.906	Jan 2020	6.370	Dec 2020	6.428	Dec 2021	-		6.428	-	-	-
Open Architecture Collaborative Working Group - Northrop Grumman	SS/CPFF	Northrop Grumman : Melbourne, FL	-	5.082	Jan 2020	5.189	Dec 2020	5.239	Dec 2021	-		5.239	-	-	-
Open Architecture Collaborative Working Group - Raytheon	SS/CPFF	Raytheon : El Segundo, CA	-	1.923	Jan 2020	1.979	Dec 2020	1.912	Dec 2021	-		1.912	-	-	-
Air Force Research Laboratory (AFRL) Science and Technology Initiatives	MIPR	AFRL : Various	-	1.239	Jan 2020	2.487	Dec 2020	2.334	Dec 2021	-		2.334	-	-	-
76th Software Maintenance Group (76 SMXG) Development	PO	76 SWEG : Tinker AFB, OK	-	4.013	Jan 2020	4.498	Dec 2020	4.506	Dec 2021	-		4.506	-	-	-

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 0605056F / <i>Open Architecture Management</i>	Project (Number/Name) 656060 / <i>Standards Management</i>
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Product Development (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Engineering Support (1)	MIPR	EPASS Contract: TBD : TBD	-	0.000		0.000		-		-		-	-	-	-
Engineering Support (2)	MIPR	P3I: TBD : TBD	-	0.000		0.000		-		-		-	-	-	-
Engineering Support (3)	MIPR	MIT-LL : TBD	-	0.364	Apr 2020	0.404	Mar 2021	0.395	Jan 2022	-		0.395	-	-	-
Engineering Support (4)	MIPR	GTRI : TBD	-	0.408	Jul 2020	0.363	Mar 2021	0.000		-		0.000	-	-	-
SOSA Initiatives	C/CPFF	Existing IDIQ: TBD : TBD	-	-		-		2.758	Jan 2022	-		2.758	-	-	-
Government Avionics Reference Architecture (GARA)	C/CPAF	GTRI UARC : Atlanta, GA	-	-		-		4.375	Mar 2022	-		4.375	-	-	-
Subtotal			-	28.790		30.335		36.670		-		36.670	-	-	N/A

Management Services (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Program Management Administration	Various	OAM Program Office : Wright-Patterson AFB, OH	-	0.112	Jan 2020	0.156	Jan 2021	0.439	Jan 2022	-		0.439	-	-	-
Subtotal			-	0.112		0.156		0.439		-		0.439	-	-	N/A

	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	-	28.902	30.491	37.109	-	37.109	-	-	N/A

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 0605056F / <i>Open Architecture Management</i>	Project (Number/Name) 656060 / <i>Standards Management</i>

	FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
<i>Develop and Evolve Standards</i>																												
Quarterly Governance Boards																												
FY 2020 Annual Release of Open Mission System and Universal Command and Control Interface (OMS/UCI) Standards																												
FY 2021 Annual Release of OMS/UCI Standards																												
FY 2022 Annual Release of OMS/UCI Standards																												
FY 2023 Annual Release of OMS/UCI Standards																												
FY 2024 Annual Release of OMS/UCI Standards																												
FY 2025 Annual Release of OMS/UCI Standards																												
FY 2026 Annual Release of OMS/UCI Standards																												
FY 2020 Annual Integration Event																												
FY 2021 Annual Integration Event																												
FY 2022 Annual Integration Event																												
FY 2023 Annual Integration Event																												
FY 2024 Annual Integration Event																												
FY 2025 Annual Integration Event																												
FY 2026 Annual Integration Event																												
FY 2022 GARA Quarterly Model Update																												
FY 2022 GARA Quarterly Configuration Management Plan Updates																												

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Exhibit R-4, RDT&E Schedule Profile: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 0605056F / <i>Open Architecture Management</i>	Project (Number/Name) 656060 / <i>Standards Management</i>
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	FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
FY 2022 GARA Quarterly Conformance Plan Updates																												

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Exhibit R-4A, RDT&E Schedule Details: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 0605056F / <i>Open Architecture Management</i>	Project (Number/Name) 656060 / <i>Standards Management</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>Develop and Evolve Standards</i>				
Quarterly Governance Boards	1	2020	4	2026
FY 2020 Annual Release of Open Mission System and Universal Command and Control Interface (OMS/UCI) Standards	1	2020	1	2020
FY 2021 Annual Release of OMS/UCI Standards	1	2021	1	2021
FY 2022 Annual Release of OMS/UCI Standards	1	2022	1	2022
FY 2023 Annual Release of OMS/UCI Standards	1	2023	1	2023
FY 2024 Annual Release of OMS/UCI Standards	1	2024	1	2024
FY 2025 Annual Release of OMS/UCI Standards	1	2025	1	2025
FY 2026 Annual Release of OMS/UCI Standards	1	2026	1	2026
FY 2020 Annual Integration Event	4	2020	4	2020
FY 2021 Annual Integration Event	4	2021	4	2021
FY 2022 Annual Integration Event	4	2022	4	2022
FY 2023 Annual Integration Event	4	2023	4	2023
FY 2024 Annual Integration Event	4	2024	4	2024
FY 2025 Annual Integration Event	4	2025	4	2025
FY 2026 Annual Integration Event	4	2026	4	2026
FY 2022 GARA Quarterly Model Update	1	2022	4	2026
FY 2022 GARA Quarterly Configuration Management Plan Updates	1	2022	4	2026
FY 2022 GARA Quarterly Conformance Plan Updates	1	2022	4	2026

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force / BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 0605221F / KC-46
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COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
Total Program Element	5,643.988	52.623	0.000	0.001	0.000	0.001	-	-	-	-	-	-
655271: <i>KC-46 RDT&E</i>	5,643.988	52.623	0.000	0.001	0.000	0.001	-	-	-	-	-	-

Program MDAP/MAIS Code: 387

A. Mission Description and Budget Item Justification

Replacement of the legacy tanker fleet will take place in several stages. The initial tanker replacement increment of KC-46s will replace roughly a third of the current capability. Future programs will ultimately recapitalize the entire tanker fleet over a period of more than 30 years. The Air Force completed an Analysis of Alternatives (AoA) in Apr 2006 to determine the most appropriate strategy to recapitalize the aging fleet of aerial refueling aircraft. Based on this analysis, the Air Force concluded a strategy of full and open competition to select a commercial derivative replacement tanker aircraft would result in a best value tanker contract. To initiate the first phase of the tanker replacement, the KC-46 program released a final Request for Proposal (RFP) on 24 Feb 2010, and entered source selection on 9 Jul 2010. The KC-46 program held a Milestone B (MS B) Defense Acquisition Board (DAB) on 23 Feb 2011, received approval to enter Engineering and Manufacturing Development (EMD) from the Undersecretary of Defense (Acquisition, Technology and Logistics) (USD(AT&L)) on 24 Feb 2011, and awarded the KC-46 EMD contract to Boeing on 24 Feb 2011 to develop and procure 179 KC-46 aircraft. The program is procuring four RDT&E aircraft for integration and demonstration of capability which will ultimately be operationally fielded. During production, the program plans to procure 175 aircraft throughout 13 lots. The KC-46 program held a MS C DAB on 12 Aug 2016 and received approval to enter Low Rate Initial Production (LRIP). The program awarded LRIP Lots 1 and 2 on 18 Aug 2016, LRIP Lot 3 on 27 Jan 2017, LRIP Lot 4 on 10 Sep 2018, and LRIP Lot 5 on 27 Sep 2019. Awards for Lot 6 occurred on 12 Jan 2021 and Lot 7 awarded on 20 Jan 2021 totaling 94 aircraft to date. Lot 8 award is planned for Jan 2022. The Air Force delivered the first KC-46 to McConnell Air Force Base on 25 Jan 2019. As of 31 Mar 2021, 44 aircraft have been delivered to the Air Force. KC-46 funding also supports Training Systems, Direct Mission Support, Program Management Administration (PMA) activities, government developmental and operational test support, mission planning capability development, various studies and analyses, KC-46 requirements definition and demonstrations in support of Air Force Advanced Battle Management System (ABMS) initiative, engineering changes, and future tanker replacement planning activities.

The KC-46 will provide the capability to fuel joint and coalition receivers via a boom or drogue system on every mission and will also augment the airlift fleet with cargo, passenger, and aeromedical evacuation capabilities. The KC-46 will operate in day/night and adverse weather conditions to enable deployment, employment, sustainment, and redeployment of U.S. joint, allied, and coalition forces. The KC-46 will have communication, navigation, and surveillance equipment for worldwide operations; the capability to perform missions in chemical and biological environments; the ability to operate in up to medium threat environments with self-defense/protection (both active and passive) capabilities; and the necessary battlespace awareness to mitigate survivability threats.

The Aircrew Training System (ATS) and the Maintenance Training System (MTS) are being developed and procured using KC-46 funding. The ATS contract was awarded on 1 May 2013 to FlightSafety Services Corporation. The ATS contract will provide Aircrew Training Devices (ATDs), to include but not limited to Weapon System Trainers (WSTs), Boom Operator Trainers (BOTs), Fuselage Trainers (FuTs), and Part-Task Trainers (PTTs) at each Main Operating Base (MOB) and the Formal Training Unit (FTU). The ATS contract will also support Distributed Mission Operations (DMO), provide aircrew instruction, develop courseware, provide logistics support, acquire a technical data package to support future competition efforts, and manage training device concurrency with the aircraft.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force	Date: May 2021
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Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force / BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 0605221F / KC-46
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The MTS contract was awarded 6 Jul 2016 to The Boeing Company. The MTS acquisition focuses on designing, developing, testing, producing, and fielding an optimized training system for KC-46 maintainers by integrating various forms of training media and Maintenance Training Devices (MTDs) into a "blended" solution. This blended solution includes the appropriate mix of hardware and software, "high-fidelity" Augmented Hardware Training Devices (AHTDs), PTTs, Interactive Multimedia Instruction (IMI), and emerging technologies to meet validated Air Mobility Command (AMC) maintenance training requirements.

In FY2021, PE 0605221F, KC-46, Project 655271 KC-46 RDT&E, and Project 651120 Pegasus Capability Improvements efforts were transferred to PE 401221F, Project 655271 KC-46 RDT&E, and Project 651120 Pegasus Capability Improvements in order to consolidate all KC-46 activity under a single PE. PE 0401221F also has historical Tanker Replacement costs from FY 2005-2008.

This requirement supports performance of a full financial audit as required by title 10 U.S.C. Chapter 9A, Sec 240-D.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver KC-46 weapon system capability. The use of such programs funds would be in addition to the civilian pay expenses budgeted in program element 0605831F. In FY20 \$0.351M was expended for civilian pay expenses in this program element, and in FY21 \$0.000M is forecasted for civilian pay expenses in this program element.

This program is in Budget Activity 5, System Development and Demonstration (SDD) because it has passed Milestone B approval and is conducting engineering and manufacturing development tasks aimed at meeting validated requirements prior to full rate production.

B. Program Change Summary (\$ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Previous President's Budget	59.561	0.000	0.000	0.000	0.000
Current President's Budget	52.623	0.000	0.001	0.000	0.001
Total Adjustments	-6.938	0.000	0.001	0.000	0.001
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	-5.281	0.000			
• SBIR/STTR Transfer	-1.657	0.000			
• Other Adjustments	0.000	0.000	0.001	0.000	0.001

Change Summary Explanation

FY 2020 funding reduced due to Below Threshold Reprogrammings of \$5.281 million and Small Business Innovation Research of \$1.657 million.
 FY 2022 funding increase of \$0.001 million due to an inadvertent system error. No funding requested in FY 2022.

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force										Date: May 2021		
Appropriation/Budget Activity 3600 / 5					R-1 Program Element (Number/Name) PE 0605221F / KC-46				Project (Number/Name) 655271 / KC-46 RDT&E			
COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
655271: KC-46 RDT&E	5,643.988	52.623	0.000	0.001	0.000	0.001	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-	-	-

A. Mission Description and Budget Item Justification

Replacement of the legacy tanker fleet will take place in several stages. The initial tanker replacement increment of KC-46s will replace roughly a third of the current capability. Future programs will ultimately recapitalize the entire tanker fleet over a period of more than 30 years. The Air Force completed an Analysis of Alternatives (AoA) in Apr 2006 to determine the most appropriate strategy to recapitalize the aging fleet of aerial refueling aircraft. Based on this analysis, the Air Force concluded a strategy of full and open competition to select a commercial derivative replacement tanker aircraft would result in a best value tanker contract. To initiate the first phase of the tanker replacement, the KC-46 program released a final Request for Proposal (RFP) on 24 Feb 2010, and entered source selection on 9 Jul 2010. The KC-46 program held a Milestone B (MS B) Defense Acquisition Board (DAB) on 23 Feb 2011, received approval to enter Engineering and Manufacturing Development (EMD) from the Undersecretary of Defense (Acquisition, Technology and Logistics) (USD(AT&L)) on 24 Feb 2011, and awarded the KC-46 EMD contract to Boeing on 24 Feb 2011 to develop and procure 179 KC-46 aircraft. The program is procuring four RDT&E aircraft for integration and demonstration of capability which will ultimately be operationally fielded. During production, the program plans to procure 175 aircraft throughout 13 lots. The KC-46 program held a MS C DAB on 12 Aug 2016 and received approval to enter Low Rate Initial Production (LRIP). The program awarded LRIP Lots 1 and 2 on 18 Aug 2016, LRIP Lot 3 on 27 Jan 2017, LRIP Lot 4 on 10 Sep 2018, and LRIP Lot 5 on 27 Sep 2019. Awards for Lot 6 occurred on 12 Jan 2021 and Lot 7 awarded on 20 Jan 2021 totaling 94 aircraft to date. Lot 8 award is planned for Jan 2022. The Air Force delivered the first KC-46 to McConnell Air Force Base on 25 Jan 2019. As of 31 Mar 2021, 44 aircraft have been delivered to the Air Force. KC-46 funding also supports Training Systems, Direct Mission Support, Program Management Administration (PMA) activities, government developmental and operational test support, mission planning capability development, various studies and analyses, engineering changes, and future tanker replacement planning activities.

The KC-46 will provide the capability to fuel joint and coalition receivers via a boom or drogue system on every mission and will also augment the airlift fleet with cargo, passenger, and aeromedical evacuation capabilities. The KC-46 will operate in day/night and adverse weather conditions to enable deployment, employment, sustainment, and redeployment of U.S. joint, allied, and coalition forces. The KC-46 will have communication, navigation, and surveillance equipment for worldwide operations; the capability to perform missions in chemical and biological environments; the ability to operate in up to medium threat environments with self-defense/protection (both active and passive) capabilities; and the necessary battlespace awareness to mitigate survivability threats.

The Aircrew Training System (ATS) and the Maintenance Training System (MTS) are being developed and procured using KC-46 funding. The ATS contract was awarded on 1 May 2013 to FlightSafety Services Corporation. The ATS contract will provide Aircrew Training Devices (ATDs), to include Weapon System Trainers (WSTs), Boom Operator Trainers (BOTs), Fuselage Trainers (FuTs), and Part-Task Trainers (PTTs) at each Main Operating Base (MOB) and the Formal Training Unit (FTU). The ATS contract will also support Distributed Mission Operations (DMO), provide aircrew instruction, develop courseware, provide logistics support, acquire a technical data package to support future competition efforts, and manage training device concurrency with the aircraft.

The MTS contract was awarded 6 Jul 2016 to The Boeing Company. The MTS acquisition focuses on designing, developing, testing, producing, and fielding an optimized training system for KC-46 maintainers by integrating various forms of training media and Maintenance Training Devices (MTDs) into a "blended" solution. This

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force	Date: May 2021
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Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 0605221F / KC-46	Project (Number/Name) 655271 / KC-46 RDT&E
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blended solution includes the appropriate mix of hardware and software, "high-fidelity" Augmented Hardware Training Devices (AHTDs), PTTs, Interactive Multimedia Instruction (IMI), and emerging technologies to meet validated Air Mobility Command (AMC) maintenance training requirements.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver KC-46 weapon system capability. The use of such programs funds would be in addition to the civilian pay expenses budgeted in program element 0605831F. In FY20 \$0.351M was expended for civilian pay expenses in this program element, and in FY21 \$0.000M is forecasted for civilian pay expenses in this program element.

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2020	FY 2021	FY 2022
<p>Title: KC-46 Aircraft Product Development</p> <p>Description: EMD activities will be conducted to include the following types of activities: develop a commercial 767-2C aircraft upon which the KC-46 is based; develop the KC-46 military capability and integrate it into the aircraft; build four EMD aircraft; procure live fire assets; procure required Government Furnished Equipment (GFE); procure simulator and maintenance data; develop technical manuals and Type 1 training; and conduct development and operational testing.</p> <p>FY 2021 Plans: N/A</p> <p>FY 2022 Plans: N/A</p> <p>FY 2021 to FY 2022 Increase/Decrease Statement: N/A - This is an inadvertent system error. No funding requested in FY 2022.</p>	23.698	0.000	0.001
<p>Title: KC-46 Trainer Product Development - Maintenance Training System (MTS)</p> <p>Description: Trainer development activities will be conducted to include the following types of activities: development and procurement of MTDs, courseware, and associated support equipment.</p> <p>FY 2021 Plans: N/A</p> <p>FY 2022 Plans: N/A</p> <p>FY 2021 to FY 2022 Increase/Decrease Statement: N/A</p>	0.059	0.000	0.000
<p>Title: KC-46 Support</p> <p>Description: Development, integration, and demonstration of the KC-46 mission planning capability. In addition, studies and analysis to support planning activities for future efficiency initiatives, business case analyses, future tanker replacement planning,</p>	5.331	0.000	0.000

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 0605221F / KC-46	Project (Number/Name) 655271 / KC-46 RDT&E

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2020	FY 2021	FY 2022
and miscellaneous Program Office support and planning. Also includes requirements such as travel, office supplies, training courses, and service contracts.			
FY 2021 Plans: N/A			
FY 2022 Plans: N/A			
Title: KC-46 Test & Evaluation	23.535	0.000	0.000
Description: Test & Evaluation (T&E) activities will be conducted to include the following types of activities: Development Test & Evaluation, Operational Test & Evaluation, Tanker Qualification, Receiver Certifications, Live Fire Test & Evaluation (LFT&E), Federal Aviation Administration (FAA) support, and other test planning and organizational support.			
FY 2021 Plans: N/A			
FY 2022 Plans: N/A			
Accomplishments/Planned Programs Subtotals	52.623	0.000	0.001

C. Other Program Funding Summary (\$ in Millions)

<u>Line Item</u>	<u>FY 2020</u>	<u>FY 2021</u>	<u>FY 2022</u> <u>Base</u>	<u>FY 2022</u> <u>OCO</u>	<u>FY 2022</u> <u>Total</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>FY 2026</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• APAF 02 Line Item KC046A: KC-46A Tanker	1,930.117	-	-	-	-	-	-	-	-	-	-
• APAF 06 Line Item 000999: Initial Spares	0.000	-	-	-	-	-	-	-	-	-	-

Remarks

D. Acquisition Strategy

The KC-46 Program acquisition strategy is to procure an existing commercial, FAA certified aircraft modified to meet USAF requirements. The KC-46 program released a final RFP on 24 Feb 2010, and entered source selection on 9 Jul 2010. The KC-46 program held a MS B DAB on 23 Feb 2011, received approval to enter EMD from the USD(AT&L) on 24 Feb 2011, and awarded the KC-46 contract to Boeing on 24 Feb 2011 to develop and procure 179 KC-46 aircraft. The KC-46 contract procurement was conducted via a full and open competition per Federal Acquisition Regulation (FAR) Part 15, and resulted in a FY 2011 EMD Fixed Price Incentive Firm (FPIF) contract. The EMD phase will develop, build, and test four KC-46 aircraft, and will qualify the KC-46 as a tanker and certify pairings with receiver aircraft.

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force Date: May 2021

Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 0605221F / KC-46	Project (Number/Name) 655271 / KC-46 RDT&E
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The MS B acquisition strategy planned for two LRIP lots followed by 11 Full-Rate Production (FRP) lots for a total aircraft procurement of 175 production aircraft. An update to the acquisition strategy occurred in support of MS C that increased LRIP from two to four lots, with the total aircraft buy remaining at 175 production aircraft. A Dec 2017 USD(AT&L) Acquisition Decision Memorandum expanded LRIP to include Lot 5. Another Program Deviation Report was submitted on June 8, 2020, to declare a breach to the Full Rate Production Decision. A new APB dated October 19, 2020 was approved, and a new ADM dated October 20, 2020 re-designated Lots 6 through 9 as LRIP with the total aircraft buy remaining at 175 Production aircraft (+4 EMD aircraft for a grand total of 179 aircraft).

LRIP now consists of two Firm Fixed Price (FFP) and seven FFP Not to Exceed (NTE) options (LRIP-1 Qty 7, LRIP-2 Qty 12, LRIP-3 Qty 15, LRIP-4 Qty 18, LRIP-5 Qty 15, LRIP-6 Qty 12, and LRIP-7 Qty 15). This will be followed by four (Lots 10-13) FFP production options [via NTE values + Economic Price Adjustment (EPA)]. LRIP Lots 1 and 2 were awarded Aug 2016, LRIP Lot 3 was awarded Jan 2017, LRIP Lot 4 was awarded Sep 2018, LRIP Lot 5 was awarded Sep 2019, and LRIP Lots 6 and 7 were awarded Jan 2021. LRIP Lot 8 (Qty 12) is planned for award Jan 2022.

The ATS acquisition strategy is to provide ATDs, and associated support structure, to each MOB and the FTU. The ATS EMD FPIF contract with production options was conducted via a full and open competition per FAR Part 15, and awarded to FlightSafety Services Corporation in FY 2013. The ATS EMD phase will develop and procure ATDs; and will be supported with courseware, Training System Support Center, the technical data package, and support equipment to ensure system availability and concurrency with the aircraft. The first six ATS production options were exercised on 19 Aug 2015, 31 May 2017, 30 Apr 2018, 31 Mar 2019, 2 Sep 2020, and 4 Mar 2021. Lot 7 of 10 total lots is planned to be awarded in Jan 2022.

The MTS acquisition strategy is to acquire MTDs, and associated support structure, for two AMC active duty Regional Maintenance Training Facilities. The MTS EMD FFP contract with production options was conducted via a full and open competition per FAR Part 15, and awarded to The Boeing Company in FY 2016. The MTS EMD phase will develop and procure MTDs; and will be supported with courseware, Training System Support Center, the technical data package, and support equipment to ensure system availability and concurrency with the aircraft.

The KC-46 Program is responsible for the development, testing, and production of a drogue-equipped, wing-mounted refueling system to meet Capability Production Document (CPD) thresholds and objectives for simultaneous refueling of two probe-equipped receivers. The system can be installed or removed from the KC-46 as mission needs dictate.

The long-term support concept for the KC-46 is organic two-level maintenance (2LM): organization level (O-level) and depot level (D-level). For the purposes of this program, all maintenance other than O-level shall be referred to as D-level. The product support strategy will initially employ Interim Contractor Support (ICS) before transitioning to a 100% organically-managed maintenance and supply support capability. Performance Based Logistics (PBL) solutions will be evaluated during EMD as viable approaches to facilitate the transition.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Air Force											Date: May 2021				
Appropriation/Budget Activity 3600 / 5						R-1 Program Element (Number/Name) PE 0605221F / KC-46					Project (Number/Name) 655271 / KC-46 RDT&E				

Product Development (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
KC-46A aircraft non-recurring development, integration, and testing; 4 RDT&E tanker aircraft; and support	C/FPIF	The Boeing Company : Seattle, WA	5,072.993	23.698	Apr 2021	-		-		-		-	-	-	5,087.168
KC-46A Aircrew Training System	C/FPIF	FlightSafety Services Corp. : Centennial, CO	86.863	-		-		-		-		-	-	-	86.863
KC-46A Maintenance Training System	C/FFP	The Boeing Company : St. Louis, MO	46.358	0.059	Mar 2021	-		-		-		-	-	-	46.417
Subtotal			5,206.214	23.757		-		-		-		-	-	-	N/A

Remarks

The KC-46 EMD contract was awarded 24 Feb 2011. The total cost represents the current Program Office Estimate (POE) which accounts for the ceiling price of the contract plus the financial and schedule risk of potential design changes for the KC-46 aircraft.

FINANCIAL PERFORMANCE: The KC-46 is evaluated against traditional Research and Development (R&D) program expenditure benchmarks. Unlike many traditional R&D programs, the KC-46 EMD contract is a FPIF contract with progress payments. Twenty percent of incurred costs are withheld until the end of the contract, when they are liquidated. Mandatory funding obligations and progress payment withholds will cause the program to lag traditional expenditure benchmarks, painting an inaccurate portrait of overall program health.

Support (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
KC-46A studies and analysis associated with the development, integration, and demonstration of KC-46 capability & future planning	C/CPAF	Various : Various	94.201	4.980	Oct 2020	-		0.001		-		0.001	-	-	-
KC-46A Direct Cite Authority for Civilian Pay	Various	KC-46 Program Office : Dayton, W-P AFB, OH	0.045	0.351	Oct 2019	-		-		-		-	-	-	-

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 0605221F / KC-46	Project (Number/Name) 655271 / KC-46 RDT&E
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Support (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Subtotal			94.246	5.331	-	-	0.001	-	-	0.001	-	-	-	-	N/A

Remarks
These contracts are on an as needed basis, with various contract types and performing activities.

Test and Evaluation (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
KC-46A testing and planning support of development & operational test, FAA & military certification, and aircraft qualification activities	Various	Various : Various	219.207	16.055	Oct 2020	-	-	-	-	-	-	-	-	-	-
KC-46A Long Term Test Aircraft Maintenance Support	SS/CPAF	The Boeing Company : Edwards AFB, CA	0.000	7.480	Sep 2020	-	-	-	-	-	-	-	-	-	-
Subtotal			219.207	23.535	-	-	-	-	-	-	-	-	-	-	N/A

Remarks
Integrated testing and planning activities are performed by government organizations, with some contractor technical subject matter experts and teaming with the prime contractor.

Management Services (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
KC-46A Program Management Administration - Program A&AS Support	C/FFP	US Falcon : Dayton, OH	65.378	-	-	-	-	-	-	-	-	-	-	-	65.378
KC-46A Program Management	C/CPFF	HX5 : Fort Walton Beach, FL	11.575	-	-	-	-	-	-	-	-	-	-	-	11.575

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 0605221F / KC-46	Project (Number/Name) 655271 / KC-46 RDT&E
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Management Services (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Administration - Trainer A&AS Support															
KC-46A Program Management Administration - Other	Various	KC-46 Program Office : Dayton, W-P AFB, OH	47.368	0.000	Oct 2020	-		-		-		-	-	-	-
Subtotal			124.321	0.000		-		-		-		-	-	-	N/A

Remarks
Two Direct Mission Support contracts in FY20 over \$1M.

	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	5,643.988	52.623	0.000	0.001	-	0.001	-	-	N/A

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 0605221F / KC-46	Project (Number/Name) 655271 / KC-46 RDT&E
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FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

KC-46																												
EMD: KC-46 Aircraft																												
Developmental Test and Evaluation to support aircraft delivery																												
Receiver Certification																												
Initial Operational Test and Evaluation																												
Government Testing for Correction of Deficiencies																												
Boom Telescope Actuator Redesign ECP																												
Mission Planning Support																												
Aircrew Training System Development and Updates																												
Maintenance Training System Development & Updates																												

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Exhibit R-4A, RDT&E Schedule Details: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 0605221F / KC-46	Project (Number/Name) 655271 / KC-46 RDT&E
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Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
KC-46				
EMD: KC-46 Aircraft	1	2020	4	2020
Developmental Test and Evaluation to support aircraft delivery	1	2020	4	2020
Receiver Certification	1	2020	4	2020
Initial Operational Test and Evaluation	1	2020	4	2020
Government Testing for Correction of Deficiencies	1	2020	4	2020
Boom Telescope Actuator Redesign ECP	1	2020	4	2020
Mission Planning Support	1	2020	4	2020
Aircrew Training System Development and Updates	1	2020	4	2020
Maintenance Training System Development & Updates	1	2020	4	2020

Note
Events after Q4 2020 are reflected in PE 0401221F. Funding moved to PE 0401221F in FY 2021.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 0605223F / <i>Advanced Pilot Training</i>
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COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
Total Program Element	337.008	328.414	248.216	188.898	0.000	188.898	-	-	-	-	-	-
655340: <i>Advanced Trainer Replacement T-X</i>	337.008	328.414	248.216	188.898	0.000	188.898	-	-	-	-	-	-
Quantity of RDT&E Articles	5	-	-	-	-	-	-	-	-	-	-	-

Program MDAP/MAIS Code: 436

Note

Prior Years Funding \$4.994M was executed in PE 0604233F.

A. Mission Description and Budget Item Justification

The Advanced Pilot Training (APT) program will replace the Air Education Training Command's (AETC) aging T-38C fleet with new aircraft, Ground Based Training System (simulators, training devices, computer based training systems, academics, etc.), Maintenance Training System, and support infrastructure currently used in the fighter/bomber advanced Specialized Undergraduate Pilot Training track as well as in the Introduction to Fighter Fundamentals program. The APT program acquisition strategy was approved by OSD (AT&L) in early FY 2017 (December 2016). At the same time, the APT Team completed their Development Request for Proposal (RFP) Release Defense Acquisition Board and subsequently released the RFP to industry on 30 December 2016. The Program completed source selection evaluations and Milestone B in September 2018 and awarded a Fixed Price Incentive Firm (FPIF) Indefinite Delivery/Indefinite Quantity contract to The Boeing Company on 27 September 2018.

Funding contained in this platform's documentation directly aids AETC flying training enterprise to continue its overall Future Years Defense Program pilot production increase starting in FY 2020, thus reducing the USAF Pilot Shortage.

This requirement supports performance of a full financial audit as required by title 10 U.S.C. Chapter 9A, Sec 240-D

This program element may include necessary civilian pay expenses required to manage, execute, and deliver Advanced Pilot Training system capability. The use of such programs funds would be in addition to the civilian pay expenses budgeted in program element 0605831F. In FY20 \$0.979M was expended for civilian pay expenses in this program element, and in FY21 \$1.060M is forecasted for civilian pay expenses in this program element.

This program is in Budget Activity 5, System Development and Demonstration (SDD) because it has passed Milestone B approval and is conducting engineering and manufacturing development tasks aimed at meeting validated requirements prior to full rate production.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 0605223F / <i>Advanced Pilot Training</i>
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B. Program Change Summary (\$ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Previous President's Budget	340.373	248.669	206.417	0.000	206.417
Current President's Budget	328.414	248.216	188.898	0.000	188.898
Total Adjustments	-11.959	-0.453	-17.519	0.000	-17.519
• Congressional General Reductions	0.000	-0.453			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	-11.959	0.000			
• Other Adjustments	0.000	0.000	-17.519	0.000	-17.519

Change Summary Explanation

FY 20 funding reduced by \$11.959 million for Small Business Innovation Research (SBIR).

FY 22 funding request reduced by \$17.519 million to account for availability of prior year execution balances, shift of Milestone C to FY23, and other economic adjustments.

C. Accomplishments/Planned Programs (\$ in Millions)	FY 2020	FY 2021	FY 2022
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Title: Advanced Pilot Training (APT) Program	328.414	248.216	188.898
<p>Description: The Advanced Pilot Training (APT) program has an approved acquisition strategy, completed Milestone B, and has progressed into the Engineering and Manufacturing Development (EMD) phase. In FY20, the APT program concluded the Critical Design Review for the Aircraft and Ground Based Training System. This effort includes studies, analysis, acquisition documentation, and market research activities to reduce risk and support the acquisition strategy and engineering and manufacturing development. It also includes Program Management Administration (PMA) such as travel, Other Government Costs (OGC), and Advisory and Assistance Services (A&AS).</p> <p>FY 2021 Plans: Program plans to continue developmental test & evaluation. Plans also include PMA such as travel, OGC's and A&AS.</p> <p>FY 2022 Plans: Program plans to continue developmental test & evaluation, accept delivery of five engineering manufacturing test aircrafts and multiple ground training devices. Plans also include PMA such as travel, OGC's and A&AS.</p> <p>FY 2021 to FY 2022 Increase/Decrease Statement:</p>			

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force	Date: May 2021
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Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 0605223F / <i>Advanced Pilot Training</i>
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C. Accomplishments/Planned Programs (\$ in Millions)	FY 2020	FY 2021	FY 2022
Funding decrease due to anticipated development test & evaluation completion and projected test article delivery by mid-year.			
Accomplishments/Planned Programs Subtotals	328.414	248.216	188.898

D. Other Program Funding Summary (\$ in Millions)											
Line Item	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
• APAF 03 Line Item APT000: <i>Advanced Trainer Replacement T-X</i>	-	-	10.397	-	10.397	-	-	-	-	-	-
• OPAF 03 Line Item 837300: <i>Base Comm Infrastructure</i>	-	-	0.000	-	0.000	-	-	-	-	-	-
• OPAF 04 Line Item 845010: <i>Base Procured Equipment</i>	-	0.300	0.000	-	0.000	-	-	-	-	-	-
• MILCON PE 0804701F: <i>T-X (Advanced Pilot Trainer) Procurement</i>	31.600	23.400	18.590	-	18.590	-	-	-	-	-	-

Remarks

E. Acquisition Strategy

This Advanced Pilot Training (APT) Program will develop, test, acquire, and sustain an affordable, agile, and integrated APT System consisting of 351 aircraft, Ground Based Training System, Maintenance Training System, support, infrastructure, and personnel to meet Air Education and Training Command's initial need date of FY 2024.

The APT program's acquisition strategy leveraged market conditions by competing and awarding development, production, and initial sustainment in a single contract award. The program completed source selection evaluations and Milestone B in September 2018 and awarded a Fixed Price Incentive Firm Indefinite Delivery/Indefinite Quantity contract to The Boeing Company on 27 September 2018 to provide for development, integration, and testing needed to meet existing APT requirements. Additional contract options are available for Low Rate Initial Production, Full Rate Production and initial sustainment transition. The Maintenance Training System will be procured under a separate contractual vehicle.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Air Force												Date: May 2021				
Appropriation/Budget Activity				R-1 Program Element (Number/Name)				Project (Number/Name)								
3600 / 5				PE 0605223F / Advanced Pilot Training				655340 / Advanced Trainer Replacement T-X								
Product Development (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total				
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract	
Advanced Pilot Training Contracts	Various	Various : TBD	290.278	308.392	Nov 2019	212.327	Nov 2020	153.389	Nov 2021	-		153.389	-	-	1,084.946	
Subtotal			290.278	308.392		212.327		153.389		-		153.389	-	-	N/A	
Support (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total				
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract	
Advanced Pilot Training Mission Support	Various	Various : Various	7.276	2.589	Mar 2020	5.218	Jun 2021	5.326	Feb 2022	-		5.326	-	-	-	
Advanced Pilot Training Direct Cite Authority Civilian Pay	Various	AFLCMC : Dayton, OH	0.000	0.979	Oct 2019	1.060	Oct 2020	-		-		-	-	-	-	
Subtotal			7.276	3.568		6.278		5.326		-		5.326	-	-	N/A	
Test and Evaluation (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total				
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract	
Advanced Pilot Training Test Support	Various	Edwards AFB : Edwards AFB, CA	10.337	9.789	Jan 2020	13.560	Jan 2021	13.800	Jan 2022	-		13.800	-	-	-	
Subtotal			10.337	9.789		13.560		13.800		-		13.800	-	-	N/A	
Management Services (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total				
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract	
Advanced Pilot Training A&AS	Various	AFLCMC : Dayton, OH	16.631	4.656	Mar 2020	8.459	Mar 2021	7.693	Mar 2022	-		7.693	-	-	-	

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Air Force											Date: May 2021		
Appropriation/Budget Activity 3600 / 5				R-1 Program Element (Number/Name) PE 0605223F / <i>Advanced Pilot Training</i>				Project (Number/Name) 655340 / <i>Advanced Trainer Replacement T-X</i>					

Management Services (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Advanced Pilot Training PMA, Other Government Costs	Various	AFLCMC : Dayton, OH	12.486	2.009	Oct 2019	7.592	Oct 2020	8.690	Oct 2021	-		8.690	-	-	-
Subtotal			29.117	6.665		16.051		16.383		-		16.383	-	-	N/A
Project Cost Totals			337.008	328.414		248.216		188.898		-		188.898	-	-	N/A

Remarks
 Prior years amounts under Program 0604233F, Specialized Undergraduate Flight Training.
 Advanced Pilot Training Studies and Analysis: \$0.935M
 Advanced Pilot Training PMA Government Costs: \$1.383M
 Advanced Pilot Training A&AS: \$2.676M

FINANCIAL PERFORMANCE: APT is evaluated against traditional Research and Development (R&D) program expenditure benchmarks. Unlike many traditional R&D programs, however, the APT EMD contract is a FPIF contract with progress payments. Ten percent of incurred costs are withheld until the end of the contract, when they are liquidated. Mandatory funding obligations and progress payment withholds will cause the program to lag traditional expenditure benchmarks, painting an inaccurate portrait of overall program health.

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Exhibit R-4A, RDT&E Schedule Details: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 0605223F / <i>Advanced Pilot Training</i>	Project (Number/Name) 655340 / <i>Advanced Trainer Replacement T-X</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>Advanced Pilot Training</i>				
Engineering and Manufacturing Development (EMD) Phase	1	2020	4	2023
Aircraft Critical Design Review (CDR)	4	2020	4	2020
APT Systems Critical Design Review (CDR)	4	2020	4	2020
Development, Test and Evaluation	1	2020	4	2022
Milestone C	4	2023	4	2023
Operational Test Readiness Review (OTRR)	4	2023	4	2023
Initial Operational Test & Evaluation (IOT&E)	1	2024	3	2024
Maintenance Training System Development	2	2024	4	2025

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 0605229F / HH-60W
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COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
Total Program Element	1,658.703	238.457	63.054	66.355	0.000	66.355	-	-	-	-	-	-
654364: <i>Combat Rescue Helicopter</i>	1,658.703	238.457	63.054	66.355	0.000	66.355	-	-	-	-	-	-
Quantity of RDT&E Articles	-	1	-	-	-	-	-	-	-	-	-	-

Program MDAP/MAIS Code: 479

A. Mission Description and Budget Item Justification

The HH-60W program will replace the aging HH-60G. The HH-60G currently supports the Air Force's core function of Personnel Recovery. The primary mission of the HH-60G is to conduct day / night / marginal weather Combat Search and Rescue (CSAR) in order to recover downed aircrew or other isolated personnel in hostile or non-permissive environments.

The HH-60W will be capable of employment day or night, in adverse weather, and across the full spectrum of threats to include chemical, biological, radiological, and nuclear. Onboard defensive capabilities will permit the HH-60W system to operate with less risk than legacy systems in an increased threat environment. An in-flight air refueling capability will provide an airborne alert capability and extend its combat mission range. The HH-60W system is capable of conducting combat search and rescue airborne mission commander duties. The aircraft will be self-supporting to the maximum extent practical. The HH-60W system may also conduct other collateral missions inherent in their capabilities to conduct Personnel Recovery, such as non-conventional assisted recovery, non-conventional evacuation operations, defense support to civil authorities, civil search and rescue, international aid, emergency aeromedical evacuation, disaster/humanitarian relief, counterdrug activities, support for National Aeronautics and Space Administration flight operations, and insertion/extraction of combat forces.

The HH-60W development program will procure a total of ten aircraft as follows: four Engineering, Manufacturing, and Development (EMD) aircraft, five System Demonstration Test Article (SDTA) aircraft, and one modernization flight test aircraft. The FY20 PB added the modernization flight test aircraft. In addition, the HH-60W program office will procure necessary ground and flight assets required for both Development Test (DT) and Initial Operational Test & Evaluation (IOT&E). The HH-60W EMD program includes development of the complete HH-60W training system to include HH-60W Weapon System Trainer (WST), Operational Flight Trainer (OFT), Airframe Systems Trainer (AST), Avionics Desktop Trainer (AVDTT), other training devices, with associated spares and support equipment, as well as Type 1 training and courseware required to perform flight, aircrew and maintenance training. Other development efforts include a systems integration laboratory, an avionics integration support facility, procurement of data rights and licenses, spares, SDTA aircraft, Government test, and product support. The HH-60W program will also pursue modernization efforts to develop and integrate enhancements in mission/defensive systems and additional system upgrades to address critical capability gaps. The program office will utilize the additional flight test aircraft in support of modernization efforts, including Infrared Countermeasures (IRCM) testing, to address emerging threats and evolving mission needs.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force	Date: May 2021
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Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 0605229F / HH-60W
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The Delta Training Device (DTD) effort will procure additional training assets, including but not limited to, maintenance and aircrew Crew Chief Part Task Trainers (CCPTT), aircrew Hoist Procedural Trainers (HPT), Virtual Reality (VR)/Mixed Reality (MR) maintenance aircrew trainers, associated spares and support equipment, as well as Type 1 training.

Capability upgrades and modernization development efforts for the HH-60W may include, but are not limited to, the following priorities: Situational Awareness Data Link/Automatic Direction Finder Removal (SADL/ADF), Distributed Aperture Infrared Countermeasures (DAIRCM), Electro Optical/Infrared Tactical Overlay (EO/IR), Global Positioning System Anti-Jam/Anti-Spoof, Degraded Visual Environment system, Integrated Vehicle Health Monitoring System Control, Video Data Link, Radio Frequency Jammer, Mobile User Objective System (MUOS), Electronic Flight Bags, and Automated Dependent Surveillance Broadcast - In Device. Capability upgrades and modernization also supports inclusion for mandates, hardware changes for diminishing manufacturing sources and Deficiency Report Resolutions. In addition, studies, development, prototyping, testing and integration of emerging technology and support equipment opportunities to increase the effectiveness of the platform are considered in capability upgrades and modernization initiatives.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver the HH-60W weapon system capability. The use of such programs funds would be in addition to the civilian pay expenses budgeted in program element 0605831F. In FY20 \$0.000M was expended for civilian pay expenses in this program element, and in FY21 \$0.000M is forecasted for civilian pay expenses in this program element.

This program is in Budget Activity 5, System Development and Demonstration (SDD) because it has passed Milestone B approval and is conducting engineering and manufacturing development tasks aimed at meeting validated requirements prior to full rate production.

B. Program Change Summary (\$ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Previous President's Budget	247.047	63.169	29.936	0.000	29.936
Current President's Budget	238.457	63.054	66.355	0.000	66.355
Total Adjustments	-8.590	-0.115	36.419	0.000	36.419
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	-8.590	0.000			
• Other Adjustments	0.000	-0.115	36.419	0.000	36.419

Change Summary Explanation

FY 2020 funding decrease of \$8.590 million for Small Business Innovation Research.
 FY 2022 funding request increase of \$36.419 million due to capabilities upgrade.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force		Date: May 2021		
Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 5: System Development & Demonstration (SDD)</i>		R-1 Program Element (Number/Name) PE 0605229F / <i>HH-60W</i>		
C. Accomplishments/Planned Programs (\$ in Millions)		FY 2020	FY 2021	FY 2022
<p>Title: HH-60W Development</p> <p>Description: Develop a new helicopter, associated training system and support elements that leverage fielded, non-developmental technologies to recapitalize the HH-60G fleet.</p> <p>FY 2021 Plans: Continue development efforts on HH-60W aircraft, training systems, modernization and associated product support, including developing and integrating mission/defensive systems to address capability gaps. Continue conducting required testing. Continue pre-operational support, training, maintenance support, facilities support, and integration. Continue studies, analysis and training courses.</p> <p>FY 2022 Plans: Continue development efforts on HH-60W aircraft, training systems, modernization and associated product support, including developing and integrating mission/defensive systems to address capability gaps. Continue conducting required testing. Continue pre-operational support, training, maintenance support, facilities support, and integration. Continue studies, analysis and training courses. The EMD program is scheduled to wind down with emphasis on deficiency resolution and support of IOT&E.</p> <p>FY 2021 to FY 2022 Increase/Decrease Statement: Funding increased due to additional mandatory cyber support efforts to correct identified deficiencies.</p>		191.266	13.177	26.106
<p>Title: HH-60W Government Test and Evaluation</p> <p>Description: Conduct test and evaluation on the HH-60W and associated training systems to support DT&E, IOT&E, Live Fire Test and Evaluation (LFT&E), and other test planning and organizational support.</p> <p>FY 2021 Plans: Test and evaluate mission/defensive systems. Complete aircraft DT&E and begin IOT&E; complete LFT&E. Plan and execute DT&E and complete IOT&E planning for follow on Capability Upgrades effort.</p> <p>FY 2022 Plans: Test and evaluate mission/defensive systems. Complete aircraft IOT&E. Continue DT&E and IOT&E for Capability Upgrades program.</p> <p>FY 2021 to FY 2022 Increase/Decrease Statement: Funding decreased due to the transition from aircraft DT&E to Capability Upgrades testing.</p>		21.794	5.056	4.400
<p>Title: Capability Upgrades & Modernization</p>		25.397	44.821	35.849

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 0605229F / HH-60W
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C. Accomplishments/Planned Programs (\$ in Millions)	FY 2020	FY 2021	FY 2022
<p>Description: Modernize the HH-60W fleet by studying, prototyping, testing and integrating developmental and non-developmental technologies into the platform.</p> <p>FY 2021 Plans: Conduct planning for an agile, flexible, long-term contracting solution to efficiently award emerging modernization opportunities to further the effectiveness of the HH-60W fleet. Continue modernization efforts based on user prioritized capabilities, including mandates, hardware changes for diminishing manufacturing sources, Deficiency Report Resolutions, studies, prototyping, testing and integration of emerging technologies, carry on equipment and support equipment opportunities. FY21 capability upgrade activities include development, integration and testing efforts for SADL/ADF removal, EO/IR and DAIRCM capabilities.</p> <p>FY 2022 Plans: Award an agile, flexible contract solution to efficiently modernize the HH-60W fleet. Continue modernization efforts based on user prioritized capabilities, mandates, diminishing manufacturing sources and material shortages, Operational Flight Programs, studies, prototyping, testing and integration of emerging technologies, carry on equipment, EO/IR, DAIRCM Capabilities, Link-16 upgrade compliance, MUOS, and support equipment opportunities.</p> <p>FY 2021 to FY 2022 Increase/Decrease Statement: Funding decreased due to adjustments in the program schedule and changes to technology readiness levels.</p>			
Accomplishments/Planned Programs Subtotals	238.457	63.054	66.355

D. Other Program Funding Summary (\$ in Millions)											
<u>Line Item</u>	<u>FY 2020</u>	<u>FY 2021</u>	<u>FY 2022</u> <u>Base</u>	<u>FY 2022</u> <u>OCO</u>	<u>FY 2022</u> <u>Total</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>FY 2026</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• MILCON Line Item 0207229F: <i>Combat Rescue Helicopter</i>	15.500	4.049	0.000	-	0.000	-	-	-	-	-	-
• APAF 04 Line Item H060WH: <i>Combat Rescue Helicopter</i>	850.535	1,083.909	792.221	-	792.221	-	-	-	-	-	-
• APAF 06 Line Item H060WH: <i>Combat Rescue Helicopter</i>	0.000	75.821	76.937	-	76.937	-	-	-	-	-	-
• APAF 05 H060WH: <i>HH-60W</i> <i>Combat Rescue Helicopter</i>	0.000	0.000	61.191	-	61.191	-	-	-	-	-	-

Remarks

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force Date: May 2021

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 0605229F / HH-60W
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E. Acquisition Strategy

Procure a new helicopter and associated training systems, and support elements that leverage fielded non-developmental technologies to recapitalize the HH-60G fleet.

Under the HH-60W development effort, the program office procured a total of ten aircraft as follows: four EMD aircraft, five SDTA aircraft, and one modernization flight test aircraft. In addition, the HH-60W program office will procure necessary ground and flight assets required for both DT and IOT&E. The FY20 PB added the modernization flight test aircraft.

The main HH-60W program includes development of the complete HH-60W system to include delivery of ten aircraft, associated training systems, to include WST, OFT, AVDTT, AST, other Part Task Trainers, with associated spares and support elements/equipment, as well as Type 1 training and course-ware required to perform flight, aircrew and maintenance training. An additional prime contract was awarded to develop and acquire additional training devices. Other efforts include, but are not limited to, development of a systems integration laboratory and an avionics integration support facility, as well as procurement of data rights and licenses, spares, SDTA and product support for the EMD effort. The HH-60W modernization effort will maximize, where possible, opportunities for production line cut-in to minimize the amount of future post-production modifications needed.

The current contract types for this effort are predominantly Fixed Price. As originally planned following source selection, a formal HH-60W Training System Requirements Analysis (TSRA) was completed in Sep 2015. This analysis identified additional training requirements not accounted for in the original contract. These additional training devices, associated spares, support equipment, Type 1 Training and initial contractor support were competitively awarded in Aug 18.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 0605229F / HH-60W	Project (Number/Name) 654364 / Combat Rescue Helicopter
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Product Development (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
HH-60W aircraft development, integration, test articles, trainers, support and contractor test	C/FPIF	Sikorsky Aircraft Corporation : Stratford, CT	1,537.799	154.302	Jan 2020	9.623	Jan 2021	17.006	Jan 2022	-		17.006	-	-	-
Acquisition of additional HH-60W training devices	C/FFP	Logistics Services Int'l : TBD	21.000	9.812	Aug 2020	0.000		4.600	Mar 2022	-		4.600	-	-	-
HH-60W Capability Upgrades and Modernization	C/TBD	TBD : TBD	8.987	25.397	Jan 2020	44.821	Dec 2020	35.849	Jan 2022	-		35.849	-	-	-
Subtotal			1,567.786	189.511		54.444		57.455		-		57.455	-	-	N/A

Support (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
HH-60W product support related to aircraft development, integration, test articles, trainers and contractor test	Various	Various : TBD	25.838	27.152		3.554		4.500		-		4.500	-	-	-
Subtotal			25.838	27.152		3.554		4.500		-		4.500	-	-	N/A

Test and Evaluation (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
HH-60W planning and testing to support developmental and operational test, live fire test and other weapon system testing and support	PO	413th Test Squadron : Eglin AFB, FL	26.603	21.794	Dec 2019	5.056	Dec 2020	4.400	Dec 2021	-		4.400	-	-	-
Subtotal			26.603	21.794		5.056		4.400		-		4.400	-	-	N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 0605229F / HH-60W	Project (Number/Name) 654364 / Combat Rescue Helicopter
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Management Services (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
HH-60W A&AS Support	C/CPFF	EPASS : Dayton, OH	28.761	-		-		0.000		-		0.000	-	-	-
HH-60W Other PMA	Various	Various : Various	9.715	-		-		0.000	Oct 2021	-		0.000	-	-	-
Subtotal			38.476	-		-		0.000		-		0.000	-	-	N/A
Project Cost Totals			1,658.703	238.457		63.054		66.355		-		66.355	-	-	N/A

Remarks
 FINANCIAL PERFORMANCE: HH-60W is evaluated against traditional Research and Development (R&D) program expenditure benchmarks. Unlike many traditional R&D programs, however, the HH-60W EMD contract is a FPIF contract with progress payments. Ten percent of incurred costs are withheld until the end of the contract, when they are liquidated. Mandatory funding obligations, progress payment restrictions and DFAS withholds will cause the program to lag traditional expenditure benchmarks, painting an inaccurate portrait of overall program health.

FY20+: Transitioned Management Services to 3010.

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Exhibit R-4, RDT&E Schedule Profile: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 0605229F / HH-60W	Project (Number/Name) 654364 / Combat Rescue Helicopter
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FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

HH-60W	
HH-60W EMD Development	
HH-60W CRH Training System EMD Development	
HH-60W Test and Evaluation	
Developmental Test and Evaluation	
Capability Upgrades and Modernization	
Required Assets Available for Initial Operational Capability	■

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Exhibit R-4A, RDT&E Schedule Details: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 0605229F / HH-60W	Project (Number/Name) 654364 / Combat Rescue Helicopter
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Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
HH-60W				
HH-60W EMD Development	1	2020	4	2022
HH-60W CRH Training System EMD Development	1	2020	4	2022
HH-60W Test and Evaluation	1	2020	4	2026
Developmental Test and Evaluation	1	2020	4	2021
Capability Upgrades and Modernization	1	2020	4	2026
Required Assets Available for Initial Operational Capability	2	2021	2	2021

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 0605931F / <i>B-2 Defensive Management System</i>
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COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
Total Program Element	0.000	224.358	0.000	0.000	0.000	0.000	-	-	-	-	-	-
653844: <i>B-2 DMS</i>	0.000	224.358	0.000	0.000	0.000	0.000	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-	-	-

Program MDAP/MAIS Code: 431

A. Mission Description and Budget Item Justification

The B-2A Spirit is the world's most advanced long-range strike asset. The unique combination of range, payload and stealth (anti-access and global strike missions) characteristics allow the B-2 to target and destroy the highest value enemy targets, regardless of location, and return home safely. RDT&E projects are necessary to both preserve this strategic advantage as well as increase the flexibility and lethality of this national asset tasked across a broad spectrum, from tactical to national objectives.

This RDT&E program reflects the restructure of the current DMS-M EMD effort and transition to the modernization of the B-2 cockpit display sub-system. The legacy multi-function display units (MDUs) are not supportable due to obsolescence and repair issues. Without this program, display availability will severely impact aircraft availability.

In FY 2020 and prior, the B-2 DMS-M effort was documented in PE 0605931F B-2 DMS, Project 653844 B-2 DMS; the de-scoped effort was re-named to B-2 Displays Modernization (BDM) and is now documented in PE 0101127F B-2 Squadrons, Project 675345 B-2 Modernization.

Funds may be used to resolve emerging safety of flight and diminishing manufacturing sources issues, accommodate technology insertion and fulfill FAA or other mandates necessary to ensure continued aircrew safety and mission effectiveness.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver B-2 DMS-M weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program element 0605831F.

This program is in Budget Activity 5, System Development and Demonstration (SDD) because it has passed Milestone B approval and is conducting engineering and manufacturing development tasks aimed at meeting validated requirements prior to full rate production.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force</i> / BA 5: <i>System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 0605931F / <i>B-2 Defensive Management System</i>
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B. Program Change Summary (\$ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Previous President's Budget	250.100	0.000	0.000	0.000	0.000
Current President's Budget	224.358	0.000	0.000	0.000	0.000
Total Adjustments	-25.742	0.000	0.000	0.000	0.000
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	-17.229	0.000			
• SBIR/STTR Transfer	-8.513	0.000			
• Other Adjustments	0.000	0.000	0.000	0.000	0.000

Change Summary Explanation

FY 2020 changes are -17.229M on FY20 OMNIBUS and -8.513M for Small Business Innovative Research.

C. Accomplishments/Planned Programs (\$ in Millions)	FY 2020	FY 2021	FY 2022
<p>Title: B-2 Defensive Management System Modernization (DMS-M) EMD</p> <p>Description: DMS Modernization program develops improved aircrew situational awareness through replacement of passive antennas, receiver/processors, and display processors. DMS-M also addresses critical system shortfalls, and improves legacy DMS component repair issues.</p> <p>FY 2021 Plans: N/A - Transitioned to PE 0101127F</p> <p>FY 2022 Plans: N/A - Transitioned to PE 0101127F</p> <p>FY 2021 to FY 2022 Increase/Decrease Statement: N/A - No increase/decrease from FY 2021 to FY 2022</p>	224.358	0.000	0.000
Accomplishments/Planned Programs Subtotals	224.358	0.000	0.000

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force / BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 0605931F / <i>B-2 Defensive Management System</i>
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D. Other Program Funding Summary (\$ in Millions)

<u>Line Item</u>	<u>FY 2020</u>	<u>FY 2021</u>	<u>FY 2022</u> <u>Base</u>	<u>FY 2022</u> <u>OCO</u>	<u>FY 2022</u> <u>Total</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>FY 2026</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• RDTE 07 0101127F: <i>B-2 Squadrons</i>	93.076	187.399	133.661	0.000	133.661	-	-	-	-	-	-

Remarks

Transitioned to PE 0101127F in FY 2021

E. Acquisition Strategy

See acquisition strategy in PE 0101127F for the B-2 DMS-M Displays program.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 0605931F / B-2 Defensive Management System	Project (Number/Name) 653844 / B-2 DMS
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Product Development (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Product Development	C/CPAF	Not specified. : TBD	0.000	-		-		-		-		-	-	-	-
Air Vehicle - Technology Development	SS/CPFF	Various : Various, NV	0.000	-		-		-		-		-	-	-	-
Air Vehicle - Engineering and Manufacturing Development (EMD)	SS/ Various	Various : Various, NV	0.000	148.524	Oct 2019	-		-		-		-	-	-	-
Subtotal			0.000	148.524		-		-		-		-	-	-	N/A

Remarks
Northrop-Grumman, Palmdale, CA is the prime contractor and integrator.

Support (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Support	C/CPAF	Not specified. : TBD	0.000	-		-		-		-		-	-	-	-
Trainers	C/CPIF	WPAFB : Dayton, OH	0.000	17.966	Nov 2019	-		-		-		-	-	-	-
Mission Planning	C/CPIF	Hanscom : Boston, MA	0.000	22.271	Feb 2020	-		-		-		-	-	-	-
Subtotal			0.000	40.237		-		-		-		-	-	-	N/A

Test and Evaluation (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Test and Evaluation	C/CPAF	Not specified. : TBD	0.000	-		-		-		-		-	-	-	-
Government Test	MIPR	AFFTC : Various, NV	0.000	10.400	Oct 2019	-		-		-		-	-	-	-
Subtotal			0.000	10.400		-		-		-		-	-	-	N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 0605931F / B-2 Defensive Management System	Project (Number/Name) 653844 / B-2 DMS
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Management Services (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Management Services	C/CPAF	Not specified. : TBD	0.000	-		-		-		-		-	-	-	-
PMA	Various	Various : Various, NV	0.000	25.197	Nov 2019	-		-		-		-	-	-	-
Subtotal			0.000	25.197		-		-		-		-	-	-	N/A

Remarks
Funding supports the A&AS, government travel, Weapon System Support Center (WSSC) lab support, and enterprise support contract with Northrop Grumman. Activities on the Northrop Grumman contract include but are not limited to, configuration management, security, test support, and risk management.

	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	0.000	224.358	0.000	-	-	-	-	-	N/A

Remarks
Northrop-Grumman, the prime contractor for the B-2 weapon system, is the integrator and prime contractor for B-2 DMS activities.

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Exhibit R-4, RDT&E Schedule Profile: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 0605931F / <i>B-2 Defensive Management System</i>	Project (Number/Name) 653844 / <i>B-2 DMS</i>

FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

B-2 DMS	
Multi-Functional Display Unit Replacement (MDU-R) RFP Release	■
MDU-R Contract Award	■
MDU-R EMD (FY21 and beyond in PE 0101127F)	■■■■

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Exhibit R-4A, RDT&E Schedule Details: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 0605931F / <i>B-2 Defensive Management System</i>	Project (Number/Name) 653844 / <i>B-2 DMS</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>B-2 DMS</i>				
Multi-Functional Display Unit Replacement (MDU-R) RFP Release	2	2020	2	2020
MDU-R Contract Award	3	2020	3	2020
MDU-R EMD (FY21 and beyond in PE 0101127F)	3	2020	4	2020

Note

FY 2021 DMS-M effort is documented in PE 0101127F B-2 Squadrons, Project 675345 B-2 Modernization.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force / BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 0101125F / <i>Nuclear Weapons Modernization</i>
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COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
Total Program Element	700.249	10.157	9.665	0.000	0.000	0.000	-	-	-	-	-	-
657007: <i>B61 LIFE EXTENSION PROGRAM</i>	700.249	10.157	9.665	0.000	0.000	0.000	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Program MDAP/MAIS Code: 468

A. Mission Description and Budget Item Justification

The purpose of this program element is to conduct and support United States Air Force (USAF) and Joint Department of Defense (DoD) / Department of Energy (DOE) acquisition activities for the modernization of nuclear weapons.

B61-12 Life Extension Program (LEP): The B61-12 LEP will integrate DOE efforts to extend the service life of the warhead with DoD efforts to develop a guided Tail Kit Assembly (TKA) required to maintain current B61 mission characteristics. Programmatic integration of the Air Force-led, joint DoD-DOE program is accomplished through the B61 LEP Project Officers Group (POG) and its subgroups. In accordance with Air Force Materiel Command mission assignment memo (dated 17 Feb 11) and National Nuclear Security Administration (NNSA)-Air Force Nuclear Weapons Center (AFNWC) Memorandum of Understanding (MOU dated 28 Jun 12), the USAF is responsible for development, acquisition and delivery of a guided TKA and All Up Round (AUR) technical integration, system qualification and fielding of the B61-12 variant on multiple platforms.

Funds may be used to address emerging and short-notice Diminishing Manufacturing Sources and Material Shortage (DMSMS) issues.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver weapon system capability. The use of such programs funds would be in addition to the civilian pay expenses budgeted in program element 0605831F. In FY20 \$0M was expended for civilian pay expenses in this program element, and in FY21 \$0M is forecasted for civilian pay expenses in this program element.

This program is in Budget Activity 5, System Development and Demonstration (SDD) because it has passed Milestone B approval and is conducting engineering and manufacturing development tasks aimed at meeting validated requirements prior to full rate production.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force	Date: May 2021
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Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 0101125F / <i>Nuclear Weapons Modernization</i>
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B. Program Change Summary (\$ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Previous President's Budget	27.564	9.683	0.000	0.000	0.000
Current President's Budget	10.157	9.665	0.000	0.000	0.000
Total Adjustments	-17.407	-0.018	0.000	0.000	0.000
• Congressional General Reductions	0.000	-0.018			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	-16.539	0.000			
• SBIR/STTR Transfer	-0.868	0.000			
• Other Adjustments	0.000	0.000	0.000	0.000	0.000

Change Summary Explanation

FY 2020 Adjustments

-\$1.300M, ATR, AF FY20-23 PA DoD FY20-10 PA - FY20 Omnibus (Part 1, Base Implementation II)

-\$14.000M, ATR, AF FY20-23 PA DoD FY20-10 PA - FY20 Omnibus (Part 1)

-\$2.539M, BTR, Nuclear Weapons Center civilian pay

-\$0.868M, SBIR

FY 2021 Adjustments

-\$0.018M, Congressional General Reduction

C. Accomplishments/Planned Programs (\$ in Millions)

	FY 2020	FY 2021	FY 2022
Title: Engineering & Manufacturing Development Contract (B61)	8.490	0.000	0.000
Description: Prime contract to develop, test, integrate and nuclear certify a guided TKA in support of the B61-12 LEP.			
FY 2021 Plans: Finalizes B61-12 TKA program practices to ensure the following are met: requirements flow down, requirement allocation to hardware and software, requirements compliance matrix, system performance, reliability, maintainability, product assurance, testability, producibility and supportability.			
FY 2022 Plans: N/A			
FY 2021 to FY 2022 Increase/Decrease Statement:			

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force		Date: May 2021		
Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force / BA 5: System Development & Demonstration (SDD)</i>		R-1 Program Element (Number/Name) PE 0101125F / <i>Nuclear Weapons Modernization</i>		
C. Accomplishments/Planned Programs (\$ in Millions)		FY 2020	FY 2021	FY 2022
Funding decreased because FY21 is the last year of RDT&E funding for this program. There is no RDT&E funding in FY22 and beyond.				
<p>Title: AUR Technical Integration (B61)</p> <p>Description: Covers all system engineering tasks in support of AUR technical integration, qualification & fielding, including program support to the B61 LEP POG.</p> <p>FY 2021 Plans: Finalizes B61-12 system qualification plan, warhead component qualification, TKA qualifications, and B61-12 AUR integration activities, along with any support to maintain technical and programmatic schedules.</p> <p>FY 2022 Plans: N/A</p> <p>FY 2021 to FY 2022 Increase/Decrease Statement: Funding decreased because FY21 is the last year of RDT&E funding for this program. There is no RDT&E funding in FY22 and beyond.</p>		0.100	0.100	0.000
<p>Title: Aircraft Integration (B61)</p> <p>Description: B61-12 activities associated with integration on threshold aircraft, including mission planning system upgrades to accommodate the new weapon variant. Also includes activities related to weapon design compatibility with both threshold and objective aircraft.</p> <p>FY 2021 Plans: Finalizes aircraft F-15E integration activities to support B61-12 AUR technical integration and aircraft integration. Integration activities include verifications for TKA and AUR design verification. Continues integration of B-2, F-15E, F-16 system qualification testing for B61-12 AUR and B-2 mission planning.</p> <p>FY 2022 Plans: N/A</p> <p>FY 2021 to FY 2022 Increase/Decrease Statement: Funding decreased because FY21 is the last year of RDT&E funding for this program. There is no RDT&E funding in FY22 and beyond.</p>		1.149	9.465	0.000
<p>Title: Test Support (B61)</p>		0.418	0.100	0.000

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force	Date: May 2021
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Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 0101125F / <i>Nuclear Weapons Modernization</i>
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C. Accomplishments/Planned Programs (\$ in Millions)	FY 2020	FY 2021	FY 2022
<p>Description: Test activities and support for TKA design validation & verification and nuclear certification, as well as B61-12 AUR system qualification (includes design and operational certification activities).</p> <p>FY 2021 Plans: Continues test planning and execution activities to support B61-12 weapon development, AUR technical integration and aircraft integration.</p> <p>FY 2022 Plans: N/A</p> <p>FY 2021 to FY 2022 Increase/Decrease Statement: Funding decreased because FY21 is the last year of RDT&E funding for this program. There is no RDT&E funding in FY22 and beyond.</p>			
Accomplishments/Planned Programs Subtotals	10.157	9.665	0.000

D. Other Program Funding Summary (\$ in Millions)											
Line Item	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
• PAAF 01 354040: <i>B61</i>	55.773	35.634	2.709	-	2.709	-	-	-	-	-	-

Remarks

E. Acquisition Strategy

The Milestone Decision Authority directed a three-fold competitive acquisition strategy at the 30 April 2012 Materiel Development Decision. 1) A single prime contractor was chosen to develop the B61-12 TKA through Engineering Manufacturing and Development (EMD) using full and open competition. EMD consists of two phases; 2) the prime contractor is to maintain competition at the subcomponent level; and 3) a sole source contract was awarded for production to the EMD contractor.

MS-C in 1QFY19 approved entry into Low Rate Initial Production/Lot 1 and the purchase of both long-lead items and life-of-type buys supporting Lot 2 Advanced Procurement for Full Rate Production.

The MDA approved entry into Full Rate Production on October 19, 2020.

B61-12 AUR integration, qualification and acceptance will be conducted through the joint DoD-DOE/NNSA Phase 6.X process and managed through the B61 LEP POG. Sandia National Laboratory will conduct the TKA/Bomb Assembly (BA) technical integration on behalf of the Air Force.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 0101125F / Nuclear Weapons Modernization	Project (Number/Name) 657007 / B61 LIFE EXTENSION PROGRAM
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Product Development (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
B61 LEP EMD Contracts	C/CPIF	Boeing : St Charles, MO	325.470	-		-		-		-		-	-	-	325.470
Subtotal			325.470	-		-		-		-		-	-	-	N/A

Remarks
FY21 EMD contract cost decrease due to conclusion of program testing.
EMD Phase II Period of Performance ends June 2020.

Support (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
AUR Technical Integration	MIPR	Various : various	72.002	0.100	Jun 2020	0.100	Apr 2021	-		-		-	-	-	-
Aircraft Integration	MIPR	Various : various	184.880	1.149	Feb 2020	0.215	Apr 2021	-		-		-	-	-	-
Subtotal			256.882	1.249		0.315		-		-		-	-	-	N/A

Remarks
FY21 AUR Technical Integration and Aircraft Integration cost aligns with program schedule and requirements in aircraft integration activities.

Test and Evaluation (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Test Support for B61 LEP Development	PO	96 TW : Eglin, FL	63.041	0.418	Mar 2020	0.100	Jun 2021	-		-		-	-	-	-
526.1 Assets	MIPR	Various : Various	8.207	-		-		-		-		-	-	-	-
Subtotal			71.248	0.418		0.100		-		-		-	-	-	N/A

Remarks
FY21 Test Support cost decrease aligns with program schedule and conclusion of test activities.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 0101125F / Nuclear Weapons Modernization	Project (Number/Name) 657007 / B61 LIFE EXTENSION PROGRAM
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Management Services (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
PMA	Various	various : various	46.649	8.490	Jan 2020	9.250	Mar 2021	-		-		-	-	-	-
Subtotal			46.649	8.490		9.250		-		-		-	-	-	N/A

Remarks
FY20/21 3600 funds supporting AFNWC/FM Nuclear Surety requirement.

	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	700.249	10.157	9.665	-	-	-	-	-	N/A

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 0101125F / Nuclear Weapons Modernization	Project (Number/Name) 657007 / B61 LIFE EXTENSION PROGRAM

FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

B61 LIFE EXTENSION PROGRAM	
Engineering & Manufacturing Development Phase 1	█
Engineering & Manufacturing Development Phase 2	██████
All-Up-Round Developmental/System Qualification Testing	██████████
Ground Test/Wind Tunnel Test/Flight Test	██████████
Aircraft Integration	██████████████████
TKA Milestone C Decision	██
Production Phase	██

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Exhibit R-4A, RDT&E Schedule Details: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 0101125F / <i>Nuclear Weapons Modernization</i>	Project (Number/Name) 657007 / <i>B61 LIFE EXTENSION PROGRAM</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>B61 LIFE EXTENSION PROGRAM</i>				
Engineering & Manufacturing Development Phase 1	1	2020	1	2020
Engineering & Manufacturing Development Phase 2	1	2020	3	2020
All-Up-Round Developmental/System Qualification Testing	1	2020	4	2020
Ground Test/Wind Tunnel Test/Flight Test	1	2020	4	2020
Aircraft Integration	1	2020	4	2021
TKA Milestone C Decision	1	2020	1	2020
Production Phase	1	2020	1	2023

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force / BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 0207171F / F-15 EPAWSS
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COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
Total Program Element	803.500	46.040	170.368	112.012	0.000	112.012	-	-	-	-	-	-
657108: EPAWSS DEVELOPMENT	803.500	46.040	170.368	112.012	0.000	112.012	-	-	-	-	-	-
Quantity of RDT&E Articles	1	5	2	-	-	-	-	-	-	-	-	-

Program MDAP/MAIS Code: 485

Note
 In FY 2016, PE 0207171F, F-15 EPAWSS, Project 676038, EPAWSS, Budget Activity 07, Operational Systems Development was transferred to PE 0207171F, F-15 EPAWSS, Project 657108, EPAWSS Development, Budget Activity 05, System Development and Demonstration to align the program in the correct budget activity.

 In FY 2015, PE 0207134F, F-15E Squadrons, Project 670131, Initial Operational Test and Evaluation, F-15 EPAWSS development efforts were transferred to PE 0207171F, F-15 EPAWSS, Project 676038, EPAWSS in order to provide budget transparency.

 Prior Years funding in FY 2013 and FY 2014 of \$15.100M was executed in PE 0207134F. Prior Year funding in FY 2015 of \$37.726M was executed in PE 0207171F, Project 676038.

A. Mission Description and Budget Item Justification
 The legacy F-15 Tactical Electronic Warfare System (TEWS) is functionally obsolete. It uses 1970's analog technology to combat 1980s-era radar-based ground and air threats. In addition, this aging system is becoming more difficult and expensive to sustain. As a result, the Air Force is replacing TEWS with the F-15 Eagle Passive/Active Warning and Survivability System (EPAWSS). F-15 EPAWSS is an advanced digital electronic warfare system capable of detecting, identifying, locating, denying, degrading, disrupting, and defeating modern and emerging threat systems in contested airspace with dense radio-frequency (RF) background environments. F-15 EPAWSS will provide indication, type, and position of ground-based RF threats as well as the indication, type, and bearing of airborne threats with the situational awareness needed to avoid, engage, or negate the threat. It will also prevent RF and infrared threat systems from detecting or acquiring accurate targeting information to complicate and/or negate an enemy threat targeting solution. Finally, EPAWSS will counter numerous threat systems at end-game via electronic countermeasures (jamming), chaff, and/or flares.

 This program element may include necessary civilian pay expenses required to manage, execute, and deliver weapon system capability. The use of such programs funds would be in addition to the civilian pay expenses budgeted in program element 0605831F. In FY20 no funding was expended for civilian pay expenses in this program element, and in FY21 \$1.869M is forecasted for civilian pay expenses in this program element.

 This program is in Budget Activity 5, System Development and Demonstration (SDD) because it has passed Milestone B approval and is conducting engineering and manufacturing development tasks aimed at meeting validated requirements prior to full rate production.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600: Research, Development, Test & Evaluation, Air Force I BA 5: System Development & Demonstration (SDD)	R-1 Program Element (Number/Name) PE 0207171F / F-15 EPAWSS
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B. Program Change Summary (\$ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Previous President's Budget	47.322	170.679	12.251	0.000	12.251
Current President's Budget	46.040	170.368	112.012	0.000	112.012
Total Adjustments	-1.282	-0.311	99.761	0.000	99.761
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	-1.282	0.000			
• Other Adjustments	0.000	-0.311	99.761	0.000	99.761

Change Summary Explanation

FY 2020 reduction due to Small Business Innovation Research (SBIR). FY 2021 reduction due to inflation adjustment. FY 2022 increase to fund program to April 2021 Air Force Non-Advocate Cost Assessment (NACA).

C. Accomplishments/Planned Programs (\$ in Millions)

	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Title: Eagle Passive/Active Warning Survivability System (EPAWSS)	46.040	170.368	112.012	0.000	112.012
Description: Planned replacement of the existing F-15 self-protection, Tactical Electronic Warfare System (TEWS). This includes technical and acquisition related studies.					
FY 2021 Plans: Completing test aircraft modifications and continuing qualification testing. Continue developmental ground and flight tests, software integration, and test program set development. Funds may be used to resolve emerging safety of flight issues, accommodate technology insertion and fulfill FAA or other mandates necessary to ensure continued aircrew safety and mission effectiveness.					
FY 2022 Base Plans: Complete qualification testing of EPAWSS hardware, developmental ground testing, software integration, and test program set development. Continue developmental flight test and logistics support planning efforts, such as development of Maintenance and Flight Tech Pubs. Funds may be used to resolve emerging safety of flight issues, accommodate technology insertion, resolve any hardware or software anomalies identified in developmental testing, address issues with developmental test aircraft, address required EPAWSS-specific					

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 0207171F / F-15 EPAWSS
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C. Accomplishments/Planned Programs (\$ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
support from other systems on the F-15, and fulfill FAA or other mandates necessary to ensure continued aircrew safety and mission effectiveness.					
FY 2022 OCO Plans: N/A					
FY 2021 to FY 2022 Increase/Decrease Statement: FY 2022 increase to fund program to April 2021 Air Force Non-Advocate Cost Assessment (NACA).					
Accomplishments/Planned Programs Subtotals	46.040	170.368	112.012	0.000	112.012

D. Other Program Funding Summary (\$ in Millions)											
<u>Line Item</u>	<u>FY 2020</u>	<u>FY 2021</u>	<u>FY 2022 Base</u>	<u>FY 2022 OCO</u>	<u>FY 2022 Total</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>FY 2026</u>	<u>Cost To Complete</u>	<u>Total Cost</u>
• APAF 05 Line Item	125.417	0.000	149.797	-	149.797	-	-	-	-	-	-
F15EWS: <i>Aircraft Modification</i>											
• APAF 07 Line Item 000999:	4.185	0.000	28.005	-	28.005	-	-	-	-	-	-
<i>Aircraft Spares and Repair Parts</i>											
• APAF 07 000075:	-	15.058	48.823	-	48.823	-	-	-	-	-	-
<i>OTHER PRODUCTION CHARGES (OVERVIEW)</i>											

Remarks

E. Acquisition Strategy
 F-15 EPAWSS is using an evolutionary acquisition model consisting of two increments. Increment 1 replaces the existing radar warning receiver, internal countermeasure system and countermeasure dispenser system. Increment 2 adds a towed decoy and monopulse angle countermeasure capability. (Note that Increment 2 is currently an unfunded CDD requirement.) F-15 EPAWSS technical approach is to leverage mature technology where possible from other Air Force or Foreign Military Sales electronic warfare programs. To rapidly field this capability, F-15 EPAWSS is using two decision points in-lieu of a single Milestone C. Decision Point #1 (briefed 30 Oct 20 and approved via formal Acquisition Decision Memorandum 1 Dec 20) constituted formal entry into the production phase of the program and initiated procurement of the system hardware items and stand-up of the modification line. Decision Point #2 will initiate installation activities. This tailoring provides the Milestone Decision Authority the ability to accelerate Initial Operational Capability by taking hardware procurement off the program critical path, reducing the schedule impact of kit lead times.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 0207171F / F-15 EPAWSS	Project (Number/Name) 657108 / EPAWSS DEVELOPMENT
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Product Development (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Product Development	C/CPAF	Not specified. : TBD	0.000	-		-		-		-		-	-	-	-
F-15 EPAWSS TMRR	SS/ Various	Boeing : St. Louis, MO	233.738	-		-		-		-		-	-	-	175.860
F-15 EPAWSS EMD	SS/ Various	Boeing : St. Louis, MO	509.706	28.314	Feb 2020	135.010	Feb 2021	92.487	Nov 2021	-		92.487	-	-	478.786
F-15 EPAWSS	Various	Various : Various	13.268	10.328	Feb 2020	14.104		10.000		-		10.000	-	-	115.854
Subtotal			756.712	38.642		149.114		102.487		-		102.487	-	-	N/A

Remarks
 FY16PB- EPAWSS efforts were transferred from Budget Activity 7, Operational Systems Development, PE 0207171F, Project Number 676038 to Budget Activity 5, Engineering and Manufacturing Development, PE 0207171F, Project Number 657108 per OSD direction.

The individual program reference to "various" contract methods addresses other government costs for trainers, hardware, special studies, etc., that are required to meet F-15 EPAWSS program objectives. The execution vehicles between these DoD entities vary by effort.

Test and Evaluation (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Test and Evaluation	Various	Not specified. : TBD	46.788	-		4.892		2.300		-		2.300	-	-	-
Government Flight Test	Various	Various : Various	0.000	6.201	Jan 2020	14.480		6.725		-		6.725	-	-	72.735
Subtotal			46.788	6.201		19.372		9.025		-		9.025	-	-	N/A

Remarks
 The individual program reference to "various" contract methods addresses other government costs for trainers, test, hardware, special studies, etc. that are required to meet F-15 EPAWSS program objectives. The execution vehicles between these DoD entities vary by effort.

Management Services (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Management Services	C/CPAF	Not specified. : TBD	0.000	-		-		-		-		-	-	-	-

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 0207171F / F-15 EPAWSS	Project (Number/Name) 657108 / EPAWSS DEVELOPMENT
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Management Services (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Program Management Support Costs	Various	Various : Various	0.000	1.197	Feb 2020	1.882		0.500		-		0.500	-	-	44.399
Subtotal			0.000	1.197		1.882		0.500		-		0.500	-	-	N/A

Remarks
The individual program reference to "various" contract methods addresses other government costs for trainers, test, hardware, special studies, etc. that are required to meet F-15 EPAWSS program objectives. The execution vehicles between these DoD entities vary by effort.

	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	803.500	46.040	170.368	112.012	-	112.012	-	-	N/A

Remarks
Prior Years funding in FY 2013 and FY 2014 of \$15.100M was executed in PE 0207134F.
Prior Year funding in FY 2015 of \$37.726M was executed in PE 0207171F, Project 676038.

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Exhibit R-4, RDT&E Schedule Profile: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 0207171F / F-15 EPAWSS	Project (Number/Name) 657108 / EPAWSS DEVELOPMENT
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	FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
F-15 EPAWSS																												
Developmental Test																												
Group B Hardware Developmental Kits																												
Hardware Qualification Testing																												
Software Integration																												
Maintenance/Tech Pubs																												
EMD Jet mod #3 complete																												
EMD Jet mod #4 complete																												
EMD Jet mod #5 complete																												
EMD Jet mod #6 complete																												
EMD Jet mod #7 complete																												
EMD Jet mod #8 complete																												
Initial Operational Test & Evaluation (IOT&E)																												
Final System Verification Review (SVR)																												
EPAWSS Milestone C - Decision Point 1																												
EPAWSS Milestone C - Decision Point 2																												

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Exhibit R-4A, RDT&E Schedule Details: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 0207171F / F-15 EPAWSS	Project (Number/Name) 657108 / EPAWSS DEVELOPMENT
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Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
F-15 EPAWSS				
Developmental Test	1	2020	1	2024
Group B Hardware Developmental Kits	1	2020	4	2020
Hardware Qualification Testing	1	2020	2	2022
Software Integration	1	2020	1	2023
Maintenance/Tech Pubs	1	2020	3	2023
EMD Jet mod #3 complete	1	2020	1	2020
EMD Jet mod #4 complete	2	2020	2	2020
EMD Jet mod #5 complete	3	2020	3	2020
EMD Jet mod #6 complete	3	2020	3	2020
EMD Jet mod #7 complete	2	2021	2	2021
EMD Jet mod #8 complete	4	2020	4	2020
Initial Operational Test & Evaluation (IOT&E)	3	2023	4	2023
Final System Verification Review (SVR)	3	2023	3	2023
EPAWSS Milestone C - Decision Point 1	1	2021	1	2021
EPAWSS Milestone C - Decision Point 2	3	2022	3	2022

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force / BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 0207328F / <i>Stand In Attack Weapon</i>
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COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
Total Program Element	-	151.534	150.371	166.570	0.000	166.570	-	-	-	-	-	-
653133: <i>Stand In Attack Weapon</i>	-	151.534	150.371	166.570	0.000	166.570	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Stand-in Attack Weapon (SiAW) system will provide the capability to strike rapidly re-locatable targets that create the Anti-Access/Area Denial (A2/AD) environment. SiAW targets include Theater Ballistic Missile Launchers, Land Attack and Anti-Ship Cruise Missile Launchers, GPS Jammers, Anti-Satellite Systems, and Integrated Air Defense Systems. The SiAW missile system will be developed under a Digital Acquisition (DA) approach in a competitive environment that will emphasize agility and innovation. Interim capability will be pursued through the Navy's Advanced Anti-Radiation Guided Missile-Extended Range (AARGM-ER) program with improved warhead/fuze and F-35 integration (including Universal Armament Interface [UAI] and Mission Planning).

This program element may include necessary civilian pay expenses required to manage, execute, and deliver weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program element 0605831F. In FY20 \$3.210M was expended for civilian pay expenses and in FY21 \$3.701M is forecasted for civilian pay expenses in this program element.

This requirement supports performance of a full financial audit as required by title 10 U.S.C. Chapter 9A, Sec 240-D.

This program is in Budget Activity 5, System Development and Demonstration (SDD) because it has passed Milestone B approval and is conducting engineering and manufacturing development tasks aimed at meeting validated requirements prior to full rate production.

B. Program Change Summary (\$ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Previous President's Budget	162.840	160.438	165.052	0.000	165.052
Current President's Budget	151.534	150.371	166.570	0.000	166.570
Total Adjustments	-11.306	-10.067	1.518	0.000	1.518
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	-9.792			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	-6.955	0.000			
• SBIR/STTR Transfer	-4.351	0.000			
• Other Adjustments	0.000	-0.275	1.518	0.000	1.518

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force		Date: May 2021		
Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force / BA 5: System Development & Demonstration (SDD)</i>		R-1 Program Element (Number/Name) PE 0207328F / <i>Stand In Attack Weapon</i>		
Change Summary Explanation FY20: -6.955M in Reprogramming for other weapons efforts and PNT; -4.351M for Small Business Innovative Research (SBIR) FY21: Appn Conference Mark -9.792M RDT&E for "Improving funds management: Forward financing F-35 integration" FY22: No significant adjustment				
C. Accomplishments/Planned Programs (\$ in Millions)		FY 2020	FY 2021	FY 2022
Title: Warhead / Electronic Safe and Arm Fuze (ESAF) Development		16.994	19.950	13.510
Description: Development of a new warhead and ESAF to support AARGM-ER. Will design, test, and certify new warhead/ESAF.				
FY 2021 Plans: Warhead/ESAF development and qualification. Working with the USN AARGM-ER Program Office on test and integration.				
FY 2022 Plans: Continue working with the USN AARGM-ER Program Office on test and integration, and the warhead/ESAF development and qualification.				
FY 2021 to FY 2022 Increase/Decrease Statement: Funding decreased due to draw down and closure of the warhead/ESAF development and qualification.				
Title: Universal Armament Interface (UAI) / Anti-Radiation Homing (ARH) message		17.094	10.540	5.866
Description: Develop and test a UAI/ARH message set for the AARGM-ER missile.				
FY 2021 Plans: Testing, certification and validation of the UAI/ARH for the AARGM-ER missile.				
FY 2022 Plans: Continue testing, certification and validation of the UAI/ARH.				
FY 2021 to FY 2022 Increase/Decrease Statement: Funding decreased due to transition of UAI effort from implementation to checkout and validation.				
Title: F-35 Integration		34.126	15.205	17.765
Description: Integration of the AARGM-ER/SiAW missile onto the F-35. Efforts for aircraft integration will address the F-35 aircraft software development, Mission Planning capability, engineering to support weapon integration, testing, and airworthiness certification for the missile carriage and employment efforts.				
FY 2021 Plans:				

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force		Date: May 2021		
Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 5: System Development & Demonstration (SDD)</i>		R-1 Program Element (Number/Name) PE 0207328F / <i>Stand In Attack Weapon</i>		
C. Accomplishments/Planned Programs (\$ in Millions)		FY 2020	FY 2021	FY 2022
<p>Integrate the AARGM-ER on the F-35A as an interim path to the USAF SiAW; includes wind tunnel testing, F-35 weapon integration, launcher adapter design, and development of mission planning.</p> <p>FY 2022 Plans: Continue to integrate the AARGM-ER on the F-35 as an interim path to the USAF SiAW; includes ground testing, F-35 weapon integration, launcher adapter development and mission planning.</p> <p>FY 2021 to FY 2022 Increase/Decrease Statement: Funding increased due to continued integration activities of AARGM-ER on the F-35.</p>				
<p>Title: Advanced Technology Risk Reduction</p> <p>Description: Conduct risk reduction on emerging technologies for future SiAW tech insertion to maintain operational effectiveness in classified scenarios.</p> <p>FY 2021 Plans: Completion of risk reduction for the technology maturation of critical components of the SiAW weapon.</p> <p>FY 2022 Plans: Risk Reduction efforts for the technology maturation of critical components has transitioned to SiAW Development.</p> <p>FY 2021 to FY 2022 Increase/Decrease Statement: Funding decreased due to completion of risk reduction and transition to SiAW development.</p>		64.242	31.910	0.000
<p>Title: SiAW Development</p> <p>Description: Conduct SiAW technology development and testing.</p> <p>This is not a new start. This is a continuation of development efforts that were previously covered in the 21PB under Advanced Technology Risk Reduction and F-35 Integration.</p> <p>FY 2021 Plans: Continuing on from the Advance Technology Risk Reduction, SiAW will complete the preliminary design and begin weapon system integration activities of critical components and develop SiAW Government Reference Architecture (GRA) using Weapon Open System Architecture as the starting point.</p> <p>FY 2022 Plans: A continued requirement; funding will complete SiAW detailed design and continue integration activities of critical components and begin development of advanced technologies into the missile system by implementing Model Based System Engineering and</p>		-	48.046	73.784

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force	Date: May 2021
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Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 0207328F / <i>Stand In Attack Weapon</i>
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C. Accomplishments/Planned Programs (\$ in Millions)	FY 2020	FY 2021	FY 2022
Digital Engineering approaches. As advanced technologies are developed, evaluate subcomponent performance and ability to integrate into an all up round. FY 2021 to FY 2022 Increase/Decrease Statement: Funding increased due to ramp up of system integration activities and initial evaluation of advanced technologies in subcomponents and all up rounds.			
Title: Target/Test Assets, Testing, & Support Description: Provides associated government and contract support for F-35 developmental and operational testing. Includes required test assets and support, flight test equipment, construction and procurement of targets to meet mission requirements, test wing and range support to include both sea and land ranges, and ground/flight test support. FY 2021 Plans: Conduct test/range/ground support, purchase targets, test equipment, and test assets. Begin target/threat emitter acquisition, weapon cybersecurity support and test investments; begin development of flight telemetry and termination system. FY 2022 Plans: Continue test/range/ground support, purchase targets, test equipment, and test assets. Continue target/threat emitter acquisition, weapon cybersecurity support and test investments; continue development of flight telemetry and termination system. FY 2021 to FY 2022 Increase/Decrease Statement: Funding increased due to variation in testing, targets/shapes cost increase, and continued test asset & target assets builds.	19.078	24.720	55.645
Accomplishments/Planned Programs Subtotals	151.534	150.371	166.570

D. Other Program Funding Summary (\$ in Millions)											
<u>Line Item</u>	<u>FY 2020</u>	<u>FY 2021</u>	<u>FY 2022</u>	<u>FY 2022</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>FY 2026</u>	<u>Cost To</u>	<u>Total Cost</u>
			<u>Base</u>	<u>OCO</u>	<u>Total</u>					<u>Complete</u>	
• RDTE 07 0205601N: <i>Harm Improvements</i>	112.350	128.640	122.322	-	122.322	-	-	-	-	-	-
Remarks RDTE - Title: US Navy AARGM-ER Program Office, Anti-Radiation Missile Improvement (new this budget cycle was HARM Improvements) Systems Development US Navy appropriation RDT&E 1319.											

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force Date: May 2021

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 0207328F / <i>Stand In Attack Weapon</i>
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E. Acquisition Strategy

The Stand-in Attack Weapon (SiAW) program acquisition strategy is to leverage advanced technology developed during Risk Reduction to build prototypes in a competitive environment for initial capability. Through the use of Digital Model Based System Engineering (MBSE), Weapon Open System Architecture (WOSA), and Agile Software Development, the SiAW program will transition to production with continuous capability improvements. SiAW will be integrated on the F-35A. Air Force plans to continue Navy-led AARGM-ER investments to field interim F-35 SEAD capability.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 0207328F / <i>Stand In Attack Weapon</i>	Project (Number/Name) 653133 / <i>Stand In Attack Weapon</i>
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Product Development (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Warhead / ESAF Development	MIPR	NGDS : Northridge, CA	-	10.100	Dec 2019	13.700	Dec 2020	7.400	Dec 2021	-		7.400	-	-	-
Universal Armament Interface (UAI) Anti-Radiation Homing message (ARH)	MIPR	Various : Various	-	10.200	Dec 2019	6.600	Dec 2020	4.056	Dec 2021	-		4.056	-	-	-
KTR SEPM	MIPR	NGDS : Northridge, CA	-	11.000	Dec 2019	11.000	Dec 2020	12.500	Dec 2021	-		12.500	-	-	-
F-35 Integration	MIPR	Various : Various	-	32.542	Dec 2020	8.565	Apr 2021	13.000	Aug 2022	-		13.000	-	-	-
Mission Planning	MIPR	Various : Various	-	0.190	Jul 2020	1.600	Feb 2021	1.854	Dec 2021	-		1.854	-	-	-
Advance Technology Risk Reduction	MIPR	Various : Various	-	62.858	Dec 2019	30.500	Dec 2020	0.000	Dec 2021	-		0.000	-	-	-
SiAW Development	Various	Various : Various	-	0.000		46.636	Jul 2021	71.974	Nov 2021	-		71.974	-	-	-
Subtotal			-	126.890		118.601		110.784		-		110.784	-	-	N/A

Remarks
Northrop Grumman Defense Systems (NGDS)

Support (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Civ Pay - Direct Site Authorization (DCA)	Allot	AFLCMC/FZA : Wright Pat, OH	-	3.357		3.991		4.192		-		4.192	-	-	-
Subtotal			-	3.357		3.991		4.192		-		4.192	-	-	N/A

Test and Evaluation (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Government Test/Target Support (includes flight test equipment, Targets/	Various	Various : Various	-	4.952		11.931		18.876		-		18.876	-	-	-

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Exhibit R-4, RDT&E Schedule Profile: PB 2022 Air Force **Date: May 2021**

Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 0207328F / <i>Stand In Attack Weapon</i>	Project (Number/Name) 653133 / <i>Stand In Attack Weapon</i>
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FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

Warhead & ESAF Development	
Design Warhead & Electronic Safe and Arm Fuze	
UAI / ARH	
Design, test and validate UAI / ARH message set	
F-35 Integration	
External integration of SiAW on F-35	
Advanced Technology Risk Reduction	
Emerging technology maturation for future SiAW tech insertion.	
SiAW Development	
SiAW Development	
Target & Test Assets, Test, & Support	
Flight test support, range modifications, & targets	

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Exhibit R-4A, RDT&E Schedule Details: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 0207328F / <i>Stand In Attack Weapon</i>	Project (Number/Name) 653133 / <i>Stand In Attack Weapon</i>
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Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>Warhead & ESAF Development</i>				
Design Warhead & Electronic Safe and Arm Fuze	1	2020	4	2022
<i>UAI / ARH</i>				
Design, test and validate UAI / ARH message set	1	2020	4	2026
<i>F-35 Integration</i>				
External integration of SiAW on F-35	4	2020	4	2026
<i>Advanced Technology Risk Reduction</i>				
Emerging technology maturation for future SiAW tech insertion.	1	2020	4	2021
<i>SiAW Development</i>				
SiAW Development	4	2021	4	2026
<i>Target & Test Assets, Test, & Support</i>				
Flight test support, range modifications, & targets	1	2020	4	2026

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 5: System Development & Demonstration (SDD)</i>					R-1 Program Element (Number/Name) PE 0207701F / <i>Full Combat Mission Training</i>							
COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
Total Program Element	-	11.238	9.405	7.064	0.000	7.064	-	-	-	-	-	-
655012: <i>Full Combat Mission Training</i>	-	11.238	9.405	7.064	0.000	7.064	-	-	-	-	-	-

A. Mission Description and Budget Item Justification

Full Combat Mission Training (FCMT) supports Air Force Distributed Mission Operations (DMO) and Live-Virtual-Constructive (LVC) integration. FCMT funding provides research in areas benefiting the DMO/LVC environment as a whole; provides research and development to facilitate integration of fielded and newly acquired, Air Force owned training devices into DMO/LVC networks; enhances the quality of training for the systems added to the network; enables aircrews to network with LVC components to form the integrated DMO battlespace; links geographically distributed high-fidelity combat and combat support training devices including Command and Control and Intelligence, Surveillance, and Reconnaissance systems and develops, demonstrates and inserts Multi-Level Security (MLS) capability. This capability enables warfighters to exercise and train at the operational and strategic levels of war as well as conduct networked unit-level training at home station.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver weapon system capability. The use of such programs funds would be in addition to the civilian pay expenses budgeted in program element 0605831F. In FY20 \$0M was expended for civilian pay expenses in this program element, and in FY21 \$0M is forecasted for civilian pay expenses in this program element.

This program is in Budget Activity 5, System Development and Demonstration (SDD) because it has passed Milestone B approval and is conducting engineering and manufacturing development tasks aimed at meeting validated requirements prior to full rate production.

B. Program Change Summary (\$ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Previous President's Budget	9.797	9.422	6.999	0.000	6.999
Current President's Budget	11.238	9.405	7.064	0.000	7.064
Total Adjustments	1.441	-0.017	0.065	0.000	0.065
• Congressional General Reductions	0.000	-0.017			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	1.800	0.000			
• SBIR/STTR Transfer	-0.359	0.000			
• Other Adjustments	0.000	0.000	0.065	0.000	0.065

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force Date: May 2021

Appropriation/Budget Activity
3600: *Research, Development, Test & Evaluation, Air Force I BA 5: System Development & Demonstration (SDD)*

R-1 Program Element (Number/Name)
PE 0207701F / *Full Combat Mission Training*

Change Summary Explanation

No Significant Changes

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force										Date: May 2021		
Appropriation/Budget Activity 3600 / 5					R-1 Program Element (Number/Name) PE 0207701F / Full Combat Mission Training				Project (Number/Name) 655012 / Full Combat Mission Training			
COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
655012: Full Combat Mission Training	-	11.238	9.405	7.064	0.000	7.064	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Full Combat Mission Training (FCMT) supports Air Force Distributed Mission Operations (DMO) and Live-Virtual-Constructive (LVC) integration. FCMT funding provides research in areas benefiting the DMO/LVC environment as a whole; provides research and development to facilitate integration of fielded and newly acquired, Air Force owned training devices into DMO/LVC networks; enhances the quality of training for the systems added to the network; enables aircrews to network with LVC components to form the integrated DMO battlespace; links geographically distributed high-fidelity combat and combat support training devices including Command and Control and Intelligence, Surveillance, and Reconnaissance systems and develops, demonstrates and inserts Multi-Level Security (MLS) capability. This capability enables warfighters to exercise and train at the operational and strategic levels of war as well as conduct networked unit-level training at home station.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver weapon system capability. The use of such programs funds would be in addition to the civilian pay expenses budgeted in program element 0605831F. In FY20 \$0M was expended for civilian pay expenses in this program element, and in FY21 \$0M is forecasted for civilian pay expenses in this program element.

B. Accomplishments/Planned Programs (\$ in Millions)

	FY 2020	FY 2021	FY 2022
Title: Cross Domain Solutions (CDS)	2.074	1.634	1.458
Description: Development, demonstration, and insertion of Multi-Level Security (MLS) capability.			
FY 2021 Plans: Complete initial rule set accreditation process for coalition. Validate rule sets in DMO testbed environments to include Virtual Test and Training Center (VTTC) and Joint Simulation Environment (JSE). Continue development of specific Five Eyes (FVEY) rule sets for DMO. Demonstrate rule set compatibility within Government off-the-shelf (GOTS) and Commercial off-the-shelf (COTS) CDS devices. Begin development of common rule set specifications for Distributed Mission Operations Network (DMON) accreditation standards process. Begin evaluating encrypted range data integration with CDS rule sets.			
FY 2022 Plans: Continue rule set validation and documentation processes. Continue encrypted range data integration for CDS evaluations. Begin evaluating rule set implications associated with Augmented Reality Virtual Reality (AR VR) based and part task trainer technology insertion. Begin development of multinational rule sets supporting F-35 and JSE baselines. Complete FVEY rule set validation study. Complete common rule set specifications for cross CDS (GOTS/COTS) applications.			
FY 2021 to FY 2022 Increase/Decrease Statement:			

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force		Date: May 2021		
Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 0207701F / Full Combat Mission Training	Project (Number/Name) 655012 / Full Combat Mission Training		
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2020	FY 2021	FY 2022
Funding decreased due to slight reduction of efforts				
<p>Title: DMO Capabilities Development</p> <p>Description: Development, demonstrations, studies and insertions of DMO/LVC related technologies and proficiency based continuation training strategies.</p> <p>FY 2021 Plans: Begin development of tools to support learning scenario management and delivery in DMO events. Begin creation of intelligent scenario generation and syllabus adaptation for local unit and larger event (e.g., Langley Distributed Training Center (DTC)/VTTC/UWFC DTC) training. Continue readiness metrics development and integration for JSE based simulations such as the effects based simulator.</p> <p>FY 2022 Plans: Demonstrate common learning/scenario management capabilities in local unit and larger scale events. Begin creation/modifications of standards to support learning managed readiness across DMO events. Create standards-based specifications for integrating innovative technologies (e.g., AR VR and related gaming-for-training technology). Complete tools development and scenario specifications for learning management in DMO events. Complete DTC/VTTC data format specification for mission and performance tracking.</p> <p>FY 2021 to FY 2022 Increase/Decrease Statement: Funding decreased due to slight reduction of efforts</p>		4.954	4.377	2.980
<p>Title: Validation of warfighter seasoning and development of objective performance enhancements</p> <p>Description: Studies to assess and validate warfighter seasoning in continuation training and accreditation of portions of this process; studies to develop objective enhancement and measurement tools for the DMO/LVC environment.</p> <p>FY 2021 Plans: Continue to develop metrics and tools to measure training proficiency gained during LVC events. Continue metrics development and readiness tracking in larger LVC events including VTTC and DTC events. Begin development of LVC environment assessment metrics and tools for ops training. Begin field integration of performance readiness and assessment tools in target Mission Training Centers (MTC) including AWACS, F-15E and F-16. Begin specifications for readiness database for routine Combat Air Forces (CAF) tracking. Begin readiness data into current CAF Ready Aircrew Program and Defense Readiness Reporting Systems of Record.</p> <p>FY 2022 Plans:</p>		2.464	2.044	1.525

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force		Date: May 2021		
Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 0207701F / Full Combat Mission Training	Project (Number/Name) 655012 / Full Combat Mission Training		
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2020	FY 2021	FY 2022
<p>Continue development and field test of LVC environment assessment tools. Continue field integration of performance readiness and assessment tools in specific MTCs. Evaluate readiness tracking database integration for routine use in ops. Complete initial evaluations of readiness data integration with current readiness reporting Systems of Record. Begin encrypted range data integration for warfighter seasoning and readiness tracking. Begin development of readiness tracking in broader range of training environments to include AR VR and part task trainers. Begin evaluating common metrics and measures to enable joint (USN) readiness assessment and tracking. Complete readiness and tracking data specifications. Complete field evaluation and refinement of LVC environment assessment tool and metrics.</p> <p>FY 2021 to FY 2022 Increase/Decrease Statement: Funding decreased due to slight reduction of efforts</p>				
<p>Title: Other Network Studies</p> <p>Description: Research and development to provide for the integration of fielded and newly introduced, Air Force, Joint and Coalition high-fidelity flight and mission trainers.</p> <p>FY 2021 Plans: Continue development and evaluation of data specifications that enable more rapid, higher fidelity constructive modeling in DMO. Continue integration of compressed Distributed Information System (DIS) as a new DMO standard for use across the LVC range enterprise. Begin weather and threat correlation studies to improve peer-level environment assessments of integrated LVC in DMO and on instrumented ranges. Begin database development to capture AR VR technology applications and lessons learned in CAF training. Begin training effectiveness evaluations of the integration of AR VR technologies with more full fidelity sim and live training in squadron level training. Begin evaluations of alternative GOTS/COTS tools for managing learning in DMO and LVC events. Begin gap and solution analysis for peer fight fidelity assessment results from current LVC unit and range environments.</p> <p>FY 2022 Plans: Continue development and evaluation of data specifications that enable more rapid, higher fidelity constructive modeling in DMO. Demonstrate integration of higher fidelity constructive models in GOTS and COTS CGF environments. Continue data development and specifications that permit novel models and behaviors to be easily integrated in existing CGF environments. Continue development and evaluation of lower cost simulation environments to augment training, rehearsal and exercise at local units and at larger event locations (e.g., VTTC/DTCs/Joint Pacific Alaska Range Complex (JPARC). Continue solution analyses for peer fight gaps identified in field training and exercise environment evaluations. Complete AR VR database development for AR VR applications. Complete learning management tools evaluations and make recommendations for alternatives for fuller integration. Complete initial data specifications for rapid CGF model development and integration.</p> <p>FY 2021 to FY 2022 Increase/Decrease Statement:</p>		1.746	1.350	1.101

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 0207701F / Full Combat Mission Training	Project (Number/Name) 655012 / Full Combat Mission Training

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2020	FY 2021	FY 2022
Funding decreased due to slight reduction of efforts			
Accomplishments/Planned Programs Subtotals	11.238	9.405	7.064

C. Other Program Funding Summary (\$ in Millions)

N/A

Remarks

D. Acquisition Strategy

Each platform joining the DMO/LVC environment selects its own acquisition strategy based on established requirements, economic analysis, and the magnitude of the training system changes required to provide DMO capability. The initial systems in the DMO/LVC environment; F-15C/E, Airborne Warning and Control System, and F-16 Block 40/50, all required new training systems. Additionally, the operations and integration capability was created. The Training Simulation Service (TSS) acquisition strategy was used to meet a portion of these requirements. In the TSS approach, the contractor owns and provides the simulator equipment, maintains simulator concurrency with weapon systems, and has incentives to keep the equipment up to date with simulator and network technologies. Currently fielded and projected Air Force-owned flight and mission training systems without DMO/LVC capability will be modified using FCMT funds to ensure compatibility with the DMO/LVC environment. To accomplish this, the Air Force Research Laboratory will conduct research/studies to develop/implement CDS, develop DMO capabilities, validate warfighter seasoning, develop objective performance enhancements, and conduct other network studies.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 0207701F / Full Combat Mission Training	Project (Number/Name) 655012 / Full Combat Mission Training
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Support (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Cross Domain Solutions (CDS): Development, Testing and insertion of Multi-Level-Security protocols, Cross Domain rule set development and accreditation	Various	Air Force Research Lab, 711 Human Performance Wing, Human : Dayton, OH	-	2.074	Jan 2020	1.634	Jan 2021	1.458	Jan 2022	-		1.458	-	-	-
Develop DMO Capabilities: demonstration, studies and insertion of distributed mission ops related technologies and proficiency based continuation training	Various	Air Force Research Lab, 711 Human Performance Wing : Dayton, OH	-	4.954	Jan 2020	4.377	Jan 2021	2.980	Jan 2022	-		2.980	-	-	-
Validation of warfighter seasoning and development of objective performance enhancements for DMO/ LVC environment	Various	Air Force Research Lab, 711 Human Performance Wing : Dayton, OH	-	2.464	Jan 2020	2.044	Jan 2021	1.525	Jan 2022	-		1.525	-	-	-
Other Network Studies: Supporting integration of newly fielded high-fidelity training systems and networks	Various	Air Force Research Lab, 711 Human Performance Wing : Dayton, OH	-	1.746	Jan 2020	1.350	Jan 2021	1.101	Jan 2022	-		1.101	-	-	-
Subtotal			-	11.238		9.405		7.064		-		7.064	-	-	N/A
Project Cost Totals			-	11.238		9.405		7.064		-		7.064	-	-	N/A

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 0207701F / Full Combat Mission Training	Project (Number/Name) 655012 / Full Combat Mission Training
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	FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Develop metrics and tools to measure training proficiency gained during LVC events / standardize implementation at Distributed Training Centers (DTCs)																												
Integrate 5th generation systems into DMO network																												
Conduct interoperability studies to evaluate the training value of 5th generation interoperable coalition training on the Combat Air Forces (CAF) DMO network																												
Develop joint and coalition data standards and evaluate data management methods to support LVC events																												
Evaluation of the integration of different data management and tracking methods to support large scale, secure and persistent Joint and Coalition LVC events.																												
Demonstrate persistent performance measurement and readiness assessment in fourth to 5th generation LVC events																												
Evaluate network architectures and typologies for distributed secure LVC events																												
Develop gateways and CDS to integrate high-fidelity trainers with Air Force, joint, and coalition networks																												
Evaluate compressed DIS network standards for CDS in DMO																												
Integrate and evaluate multi-domain operations and kill-chain training scenarios for contested environments																												

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Exhibit R-4, RDT&E Schedule Profile: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 0207701F / Full Combat Mission Training	Project (Number/Name) 655012 / Full Combat Mission Training
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	FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Evaluate multi-national mission planning and debrief technologies in research training events																												
Implement, evaluate, and field technologies aligned with future training strategies for LVC																												
Develop specifications for live data harvesting using encrypted systems and tools																												
Update Five Eyes (FVEY) rule sets for full 4th, 5th and autonomous tactical employment training																												
Create Secure LVC testbed environment for kill chain and JADC2 ops training via DMO																												

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Exhibit R-4A, RDT&E Schedule Details: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 0207701F / <i>Full Combat Mission Training</i>	Project (Number/Name) 655012 / <i>Full Combat Mission Training</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>Full Combat Mission Training</i>				
Develop Multi-Level Security testbed and support testing on 5th Gen systems	2	2020	2	2022
Develop 4th to 5th generation rule sets for coalition integration	1	2020	2	2022
Evaluate and assess commercial and government off-the-shelf Cross Domain Solution devices (CDS)	1	2020	2	2021
Perform accreditation for CDS rule sets	2	2020	4	2021
Develop rule sets for routine Live-Virtual-Constructive (LVC) environment integration	2	2020	4	2021
Continue to develop CDS rule sets	1	2020	1	2021
Integrate scenarios and syllabi across DMO environments	1	2020	1	2021
Develop metrics for routine proficiency evaluations and determine standard format for storing/analyzing proficiency data	1	2020	2	2022
Create and evaluate alternative data formats for routinely tracking and storing performance and proficiency data	3	2020	2	2022
Refine learning managed scenario and integrate with LVC events	3	2020	1	2025
Validate training environment credibility assessments for an identified set of Air Combat Command Virtual and Constructive Environments	3	2020	3	2021
Develop and integrate After Action Review tools for Mission Training Centers	1	2020	2	2025
Develop metrics and tools to measure training proficiency gained during LVC events / standardize implementation at Distributed Training Centers (DTCs)	2	2020	4	2023
Integrate 5th generation systems into DMO network	1	2020	2	2021
Conduct interoperability studies to evaluate the training value of 5th generation interoperable coalition training on the Combat Air Forces (CAF) DMO network	1	2020	4	2022
Develop joint and coalition data standards and evaluate data management methods to support LVC events	1	2020	3	2023

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Exhibit R-4A, RDT&E Schedule Details: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 0207701F / Full Combat Mission Training	Project (Number/Name) 655012 / Full Combat Mission Training
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Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
Evaluation of the integration of different data management and tracking methods to support large scale, secure and persistent Joint and Coalition LVC events.	2	2020	4	2021
Demonstrate persistent performance measurement and readiness assessment in fourth to 5th generation LVC events	2	2020	3	2026
Evaluate network architectures and typologies for distributed secure LVC events	1	2020	2	2021
Develop gateways and CDS to integrate high-fidelity trainers with Air Force, joint, and coalition networks	3	2020	1	2024
Evaluate compressed DIS network standards for CDS in DMO	1	2020	3	2025
Integrate and evaluate multi-domain operations and kill-chain training scenarios for contested environments	3	2020	2	2024
Evaluate multi-national mission planning and debrief technologies in research training events	4	2020	4	2024
Implement, evaluate, and field technologies aligned with future training strategies for LVC	2	2020	2	2025
Develop specifications for live data harvesting using encrypted systems and tools	2	2023	4	2026
Update Five Eyes (FVEY) rule sets for full 4th, 5th and autonomous tactical employment training	4	2024	4	2026
Create Secure LVC testbed environment for kill chain and JADC2 ops training via DMO	3	2022	2	2026

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 0305176F / <i>Combat Survivor Evader Locator</i>
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COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
Total Program Element	-	0.000	0.971	0.000	0.000	0.000	-	-	-	-	-	-
654522: <i>CSAR EMD</i>	-	0.000	0.971	0.000	0.000	0.000	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-	-	-

A. Mission Description and Budget Item Justification

The Combat Survivor Evader Locator (CSEL) System provides aircrews with end-to-end global satellite secure emergency communication capability during combat and peace-time flying operations. CSEL provides a hand held radio as part of the mandatory aircrew survival gear. CSEL is a joint program (AF, Army, and Navy) and is the DoD program of record for personnel recovery survival radios. CSEL supports four of five Personnel Mission Phases: Report, Locate, Support, and Recover.

A National Security Agency (NSA) Cryptographic Modernization mandate and the Ultra High Frequency Follow-On satellite constellation are at the end of life and are driving upgrades to base stations. This effort includes development to modernize the system to integrate common waveforms, integrate broadcast reception for non-CSEL devices, provide for cryptographic modernization, leverage software defined capabilities based on the FY16 cryptographic study, and to procure intellectual property. CSEL will leverage software defined capabilities to replace the legacy handheld radio with a new device that supports report, locate, and recovery missions. The new device will leverage technological advancements and efficiencies to develop a more intuitive device that enables secure communication between the joint warfighter and rescue support teams. This funding will also be used to perform various studies and analysis in support of the CSEL Enterprise.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver 0305176F weapon system capability. The use of such programs funds would be in addition to the civilian pay expenses budgeted in program element 0305176F. In FY20 \$0M and in FY21 \$0.M was expended for civilian pay expenses in this program element.

In FY2018, PE 0305176F, Combat Survivor Evader Locator efforts were transferred to PE 1203176F, Combat Survivor Evader Locator, due to the creation of a new Major Force Program (MFP) for Space programs. In FY2021, CSEL efforts were transferred back to PE 0305176F to more closely align the program's efforts with a more applicable MFP.

This program is in Budget Activity 5, System Development and Demonstration (SDD) because it has passed Milestone B approval and is conducting engineering and manufacturing development tasks aimed at meeting validated requirements prior to full rate production.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force	Date: May 2021
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Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 0305176F / <i>Combat Survivor Evader Locator</i>
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B. Program Change Summary (\$ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Previous President's Budget	0.000	0.973	0.000	0.000	0.000
Current President's Budget	0.000	0.971	0.000	0.000	0.000
Total Adjustments	0.000	-0.002	0.000	0.000	0.000
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	-0.002			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	0.000	0.000			
• Other Adjustments	0.000	0.000	0.000	0.000	0.000

Change Summary Explanation

Funding for FY2018, FY2019, and FY2020 ONLY is aligned under APP3600, BA 05, PE C3176F.

Funding for FY2021 and out is aligned under APP3600, BA 05, PE 0306176F.

Funding from FY2019 to FY2020 (ref: APP3600, BA 05, PE C3176F) is increased by \$1.07M. The increased amount will fund NGCA, and begin development for SHIELD.

Funding from FY2020 to FY2021 is reduced by \$1.03M (ref: APP3600, BA 05, PE 0306176F). This change is driven by nearing the completion of NGCA, and continued development needs of SHIELD.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force / BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 0401221F / KC-46A Tanker Squadrons
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COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
Total Program Element	0.000	0.000	76.023	73.458	0.000	73.458	-	-	-	-	-	-
651120: <i>Pegasus Capability Improvements</i>	0.000	0.000	18.060	19.653	0.000	19.653	-	-	-	-	-	-
655271: <i>KC-46 RDT&E</i>	0.000	0.000	57.963	53.805	0.000	53.805	-	-	-	-	-	-

Program MDAP/MAIS Code: 387

Note

In FY 2021, Program Element (PE) 0605221F KC-46, Project 655271 KC-46 RDT&E, and Project 651120 Pegasus Capability Improvements efforts were transferred to PE 401221F, Project 655271 KC-46 RDT&E, and Project 651120 Pegasus Capability Improvements in order to consolidate all KC-46 activity under a single PE. PE 0401221F also has historical Tanker Replacement costs from FY 2005-2008 reflected in prior years. PE 0605221F has costs from FY 2009 to FY 2020.

A. Mission Description and Budget Item Justification

Replacement of the legacy tanker fleet will take place in several stages. The initial tanker replacement increment of KC-46s will replace roughly a third of the current capability. Future programs will ultimately recapitalize the entire tanker fleet over a period of more than 30 years. The Air Force completed an Analysis of Alternatives (AoA) in Apr 2006 to determine the most appropriate strategy to recapitalize the aging fleet of aerial refueling aircraft. Based on this analysis, the Air Force concluded a strategy of full and open competition to select a commercial derivative replacement tanker aircraft would result in a best value tanker contract. To initiate the first phase of the tanker replacement, the KC-46 program released a final Request for Proposal (RFP) on 24 Feb 2010, and entered source selection on 9 Jul 2010. The KC-46 program held a Milestone B (MS B) Defense Acquisition Board (DAB) on 23 Feb 2011, received approval to enter Engineering and Manufacturing Development (EMD) from the Undersecretary of Defense (Acquisition, Technology and Logistics) (USD(AT&L)) on 24 Feb 2011, and awarded the KC-46 EMD contract to Boeing on 24 Feb 2011 to develop and procure 179 KC-46 aircraft. The program is procuring four RDT&E aircraft for integration and demonstration of capability which will ultimately be operationally fielded. During production, the program plans to procure 175 aircraft throughout 13 lots. The KC-46 program held a MS C DAB on 12 Aug 2016 and received approval to enter Low Rate Initial Production (LRIP). The program awarded LRIP Lots 1 and 2 on 18 Aug 2016, LRIP Lot 3 on 27 Jan 2017, LRIP Lot 4 on 10 Sep 2018, and LRIP Lot 5 on 27 Sep 2019. Awards for Lot 6 occurred on 12 Jan 2021 and Lot 7 awarded on 20 Jan 2021 totaling 94 aircraft to date. Lot 8 is planned for award in Jan 2022. The Air Force delivered the first KC-46 to McConnell Air Force Base on 25 Jan 2019. As of 31 Mar 2021, 44 aircraft have been delivered to the Air Force. KC-46 funding also supports Training Systems, Direct Mission Support, Program Management Administration (PMA) activities, government developmental and operational test support, mission planning capability development, various studies and analyses, KC-46 requirements definition and demonstrations in support of Air Force Advanced Battle Management (ABMS) initiative, engineering changes, and future tanker replacement planning activities.

The KC-46 will provide the capability to fuel joint and coalition receivers via a boom or drogue system on every mission and will also augment the airlift fleet with cargo, passenger, and aeromedical evacuation capabilities. The KC-46 will operate in day/night and adverse weather conditions to enable deployment, employment, sustainment, and redeployment of U.S. joint, allied, and coalition forces. The KC-46 will have communication, navigation, and surveillance equipment for worldwide

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force	Date: May 2021
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Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 0401221F / <i>KC-46A Tanker Squadrons</i>
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operations; the capability to perform missions in chemical and biological environments; the ability to operate in up to medium threat environments with self-defense/ protection (both active and passive) capabilities; and the necessary battlespace awareness to mitigate survivability threats.

The Aircrew Training System (ATS) and the Maintenance Training System (MTS) are being developed and procured using KC-46 funding. The ATS contract was awarded on 1 May 2013 to FlightSafety Services Corporation. The ATS contract will provide Aircrew Training Devices (ATDs) to include but not limited to Weapon System Trainers (WSTs), Boom Operator Trainers (BOTs), Fuselage Trainers (FuTs), and Part-Task Trainers (PTTs) at each Main Operating Base (MOB) and the Formal Training Unit (FTU). The ATS contract will also support Distributed Mission Operations (DMO), provide aircrew instruction, develop courseware, provide logistics support, acquire a technical data package to support future competition efforts, and manage training device concurrency with the aircraft.

The MTS contract was awarded 6 Jul 2016 to The Boeing Company. The MTS acquisition focuses on designing, developing, testing, producing, and fielding an optimized training system for KC-46 maintainers by integrating various forms of training media and Maintenance Training Devices (MTDs) into a "blended" solution. This blended solution includes the appropriate mix of hardware and software, "high-fidelity" Augmented Hardware Training Devices (AHTDs), PTTs, Interactive Multimedia Instruction (IMI), and emerging technologies to meet validated Air Mobility Command (AMC) maintenance training requirements.

This requirement supports performance of a full financial audit as required by title 10 U.S.C. Chapter 9A, Sec 240-D.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver KC-46 Tanker Squadron weapon system capability. The use of such programs funds would be in addition to the civilian pay expenses budgeted in program element 0605831F. In FY20 \$0.000M was expended for civilian pay expenses in this program element, and in FY21 \$0.367M is forecasted for civilian pay expenses in this program element.

This program is in Budget Activity 5, System Development and Demonstration (SDD) because it has passed Milestone B approval and is conducting engineering and manufacturing development tasks aimed at meeting validated requirements prior to full rate production.

B. Program Change Summary (\$ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Previous President's Budget	0.000	106.262	108.598	0.000	108.598
Current President's Budget	0.000	76.023	73.458	0.000	73.458
Total Adjustments	0.000	-30.239	-35.140	0.000	-35.140
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	-30.239			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	0.000	0.000			
• Other Adjustments	0.000	0.000	-35.140	0.000	-35.140

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force Date: May 2021

Appropriation/Budget Activity
3600: *Research, Development, Test & Evaluation, Air Force / BA 5: System Development & Demonstration (SDD)*

R-1 Program Element (Number/Name)
PE 0401221F / *KC-46A Tanker Squadrons*

Change Summary Explanation

FY 2021 funding reduced due to Congressional Directed Reduction of \$21.9 million for forward financing and \$8.2 million for unjustified program growth.
FY 2022 funding request reduced by \$35.14 million due to availability of prior year execution balances.

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 0401221F / KC-46A Tanker Squadrons	Project (Number/Name) 651120 / Pegasus Capability Improvements
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COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
651120: <i>Pegasus Capability Improvements</i>	0.000	0.000	18.060	19.653	0.000	19.653	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

In FY 2021, PE 0605221F, KC-46, efforts were transferred to PE 0401221F, KC-46, in order to consolidate all KC-46 activity under a single PE. PE 0401221F also has historical Tanker Replacement costs from FY 2005-2008. PE 0605221F has costs from FY2009 to FY2020.

A. Mission Description and Budget Item Justification

The KC-46 will provide the capability to fuel joint and coalition receivers via a boom or drogue system on every mission and will also augment the airlift fleet with cargo, passenger, and aeromedical evacuation capabilities. The KC-46 will operate in day/night and adverse weather conditions to enable deployment, employment, sustainment, and redeployment of U.S. joint, allied, and coalition forces. The KC-46 will have communication, navigation, and surveillance equipment for worldwide operations; the capability to perform missions in chemical and biological environments; the ability to operate in up to medium threat environments with self-defense/ protection (both active and passive) capabilities; and the necessary battlespace awareness to mitigate survivability threats.

The dynamics and mission urgency of the post-production (post-DD-250) environment require the program to maintain a flexible and responsive posture to support a broad range of mission support needs. The KC-46 will continue to identify, design, develop, integrate, verify, certify, produce, install, field, and sustain a comprehensive range of non-recurring and recurring post-production, air vehicle enhancements and field support needs. These needs may originate from programmed Mobility Air Force (MAF) requirements, Combatant Commander Joint or Urgent Operational Needs (JUON/UON), non-programmed Federal Aviation Administration (FAA) directives, requirements identified and supported by HHQ Enterprise Capability Collaboration Teams (i.e., High Value Airborne Asset [HVAA], Air Superiority 2030, and Multi-Domain Command and Control [MDC2]), or correction of field deficiencies.

The KC-46 will continue to develop, field, and sustain warfighter capabilities to meet evolving threats and mission support requirements through Block or discrete modification or modernization programs depending on mission urgency, available funding, and programmatic and technical risks. Post-production requirements can include, but will not be limited to: avionics and structural systems/ architecture and subsystem updates, general mission equipment updates and procurement, general sustainment support, studies and analyses, future Tanker requirements simulation and training, and correction of field deficiencies.

Project 651120 funding will also support Program Management Administration (PMA) activities, test support, mission planning capability development and various studies and analyses.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver KC-46 Tanker Squadron weapon system capability. The use of such programs funds would be in addition to the civilian pay expenses budgeted in program element 0605831F. In FY20 \$0.000M was expended for civilian pay expenses in this program element, and in FY21 \$0.367M is forecasted for civilian pay expenses in this program element.

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 0401221F / KC-46A Tanker Squadrons	Project (Number/Name) 651120 / Pegasus Capability Improvements

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2020	FY 2021	FY 2022
<p>Title: KC-46A Block 1 Pegasus Advanced Communications Suite (PACS)</p> <p>Description: The KC-46A Block 1 Pegasus Advanced Communications Suite (PACS) program will satisfy Department of Defense (DoD), National Security Agency (NSA), Department of Transportation (DoT), and USAF mandates by upgrading legacy Tactical Data Link 16, Beyond Line-of-Sight (BLOS) Ultra High Frequency (UHF) Line-of-Sight (LOS) capabilities with next-generation Link 16 terminals and UHF secure, global, BLOS and anti-jam LOS satellite voice communications capabilities for the KC-46 weapon system. PACS enables compatibility and interoperability with current and planned future joint and allied forces while simultaneously increasing the survivability of secure global voice and data communications capabilities between Mobility Air Force (MAF) C2 agencies and MAF aircraft operating worldwide in or near contested environments.</p> <p>FY 2021 Plans: Contract Award of Block 1 PACS EMD program.</p> <p>FY 2022 Plans: Block 1 PACS EMD program effort.</p> <p>FY 2021 to FY 2022 Increase/Decrease Statement: Funding increased due to full work year of effort.</p>	0.000	16.211	17.056
<p>Title: Support</p> <p>Description: Studies and analysis to support planning activities for future initiatives for upgrades, future tanker replacement planning, and miscellaneous Program Office support and planning. Also includes requirements such as travel and training.</p> <p>FY 2021 Plans: Program Office Support to include studies, analysis and planning.</p> <p>FY 2022 Plans: Program Office Support to include studies, analysis and planning. Begin work on future tanker Analysis of Alternatives.</p> <p>FY 2021 to FY 2022 Increase/Decrease Statement: Funding increase required to support increased planning and support of future tanker requirements.</p>	0.000	1.849	2.597
Accomplishments/Planned Programs Subtotals	0.000	18.060	19.653

C. Other Program Funding Summary (\$ in Millions)											
<u>Line Item</u>	<u>FY 2020</u>	<u>FY 2021</u>	<u>FY 2022</u>	<u>FY 2022</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>FY 2026</u>	<u>Cost To Complete</u>	<u>Total Cost</u>
			<u>Base</u>	<u>OCO</u>	<u>Total</u>						
• APAF 05 41221F/ KC046A: KC-46A Tanker	-	4.085	1.984	-	1.984	-	-	-	-	-	-

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force	Date: May 2021
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Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 0401221F / <i>KC-46A Tanker Squadrons</i>	Project (Number/Name) 651120 / <i>Pegasus Capability Improvements</i>
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C. Other Program Funding Summary (\$ in Millions)

<u>Line Item</u>	<u>FY 2020</u>	<u>FY 2021</u>	<u>FY 2022</u> <u>Base</u>	<u>FY 2022</u> <u>OCO</u>	<u>FY 2022</u> <u>Total</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>FY 2026</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
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Remarks

D. Acquisition Strategy

The KC-46 Post-Production Change Management (PPCM) construct is comprised of processes and tools, specifically tailored to a broad spectrum of post-production requirements to support the KC-46 enterprise (e.g. weapon system, sustainability, training devices). PPCM is designed to leverage competition when applicable and emphasize configuration management and discrete cost accounting methodologies. KC-46 PPCM oversight will promote competition throughout the life cycle of the KC-46A fleet. All KC-46 post-production requirements and associated acquisition strategies will be carefully managed, reviewed, and approved at the appropriate levels by the KC-46 Division and/or Tanker Directorate senior functional leaders. PPCM requirements will employ multiple contract-types, tailored to the requirement and documented in discrete Acquisition Strategy Panel briefings, to minimize cost, technical, and schedule execution risks and ensure on-time deliverables. In addition, all ACAT-level programs, deriving from the PPCM process, will follow Department of Defense (DoD) Directive 5000.01 and DoD Instruction 5000.02 guidelines and directives, as applicable, to ensure management controls--commensurate with the scope and cost of the supported requirement.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 0401221F / KC-46A Tanker Squadrons	Project (Number/Name) 651120 / Pegasus Capability Improvements
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Product Development (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
KC-46A Capability Upgrades (to include modification and modernization)	SS/CPFF	The Boeing Company : Seattle, WA	0.000	-		16.682	Sep 2021	17.056	Dec 2021	-		17.056	-	-	-
Subtotal			0.000	-		16.682		17.056		-		17.056	-	-	N/A

Support (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Direct Mission Support	Various	KC-46 Program Office : Dayton, W-P AFB, OH	0.000	-		1.011	Oct 2020	2.597	Oct 2021	-		2.597	-	-	-
Direct Cite Authority for Civilian Pay	Various	KC-46 Program Office : Dayton, W-P AFB, OH	0.000	-		0.367	Oct 2020	0.000	Oct 2021	-		0.000	-	-	-
Subtotal			0.000	-		1.378		2.597		-		2.597	-	-	N/A

Project Cost Totals	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
	0.000	-		18.060		19.653	-	-	N/A

Remarks
 In FY21, all KC-46 funding was transferred to PE 0401221F in order to consolidate all KC-46 activity under a single PE. For all costs in FY19 and FY20, refer to PE 0605221F.

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Exhibit R-4, RDT&E Schedule Profile: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 0401221F / KC-46A Tanker Squadrons	Project (Number/Name) 651120 / Pegasus Capability Improvements
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	FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

<i>Pegasus Capability Improvements</i>	
KC-46A Block I PACS	[REDACTED]
Long Term Test Aircraft Maintenance Support	[REDACTED]

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Exhibit R-4A, RDT&E Schedule Details: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 0401221F / <i>KC-46A Tanker Squadrons</i>	Project (Number/Name) 651120 / <i>Pegasus Capability Improvements</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>Pegasus Capability Improvements</i>				
KC-46A Block I PACS	4	2021	2	2026
Long Term Test Aircraft Maintenance Support	1	2023	4	2025

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 5					R-1 Program Element (Number/Name) PE 0401221F / KC-46A Tanker Squadrons				Project (Number/Name) 655271 / KC-46 RDT&E			
COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
655271: KC-46 RDT&E	0.000	0.000	57.963	53.805	0.000	53.805	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

In FY2021, PE 0605221F KC-46, Project 655271 KC-46 RDT&E, and Project 651120 Pegasus Capability Improvements efforts were transferred to PE 401221F, Project 655271 KC-46 RDT&E, and Project 651120 Pegasus Capability Improvements in order to consolidate all KC-46 activity under a single PE. PE 0401221F also has historical Tanker Replacement costs from FY 2005-2008 reflected in prior years. PE 0605221F has costs from FY2009 to FY2020.

A. Mission Description and Budget Item Justification

Replacement of the legacy tanker fleet will take place in several stages. The initial tanker replacement increment of KC-46s will replace roughly a third of the current capability. Future programs will ultimately recapitalize the entire tanker fleet over a period of more than 30 years. The Air Force completed an Analysis of Alternatives (AoA) in Apr 2006 to determine the most appropriate strategy to recapitalize the aging fleet of aerial refueling aircraft. Based on this analysis, the Air Force concluded a strategy of full and open competition to select a commercial derivative replacement tanker aircraft would result in a best value tanker contract. To initiate the first phase of the tanker replacement, the KC-46 program released a final Request for Proposal (RFP) on 24 Feb 2010, and entered source selection on 9 Jul 2010. The KC-46 program held a Milestone B (MS B) Defense Acquisition Board (DAB) on 23 Feb 2011, received approval to enter Engineering and Manufacturing Development (EMD) from the Undersecretary of Defense (Acquisition, Technology and Logistics) (USD(AT&L)) on 24 Feb 2011, and awarded the KC-46 EMD contract to Boeing on 24 Feb 2011 to develop and procure 179 KC-46 aircraft. The program is procuring four RDT&E aircraft for integration and demonstration of capability which will ultimately be operationally fielded. During production, the program plans to procure 175 aircraft throughout 13 lots. The KC-46 program held a MS C DAB on 12 Aug 2016 and received approval to enter Low Rate Initial Production (LRIP). The program awarded LRIP Lots 1 and 2 on 18 Aug 2016, LRIP Lot 3 on 27 Jan 2017, LRIP Lot 4 on 10 Sep 2018, and LRIP Lot 5 on 27 Sep 2019. Awards for Lot 6 occurred on 12 Jan 2021 and Lot 7 awarded on 20 Jan 2021 totaling 94 aircraft to date. Lot 8 is planned to award in Jan 2022. The Air Force delivered the first KC-46 to McConnell Air Force Base on 25 Jan 2019. As of 31 Mar 2021, 44 aircraft have been delivered to the Air Force. KC-46 funding also supports Training Systems, Direct Mission Support, Program Management Administration (PMA) activities, government developmental and operational test support, mission planning capability development, various studies and analyses, engineering changes, and future tanker replacement planning activities.

The KC-46 will provide the capability to fuel joint and coalition receivers via a boom or drogue system on every mission and will also augment the airlift fleet with cargo, passenger, and aeromedical evacuation capabilities. The KC-46 will operate in day/night and adverse weather conditions to enable deployment, employment, sustainment, and redeployment of U.S. joint, allied, and coalition forces. The KC-46 will have communication, navigation, and surveillance equipment for worldwide operations; the capability to perform missions in chemical and biological environments; the ability to operate in up to medium threat environments with self-defense/protection (both active and passive) capabilities; and the necessary battlespace awareness to mitigate survivability threats.

The Aircrew Training System (ATS) and the Maintenance Training System (MTS) are being developed and procured using KC-46 funding. The ATS contract was awarded on 1 May 2013 to Flight Safety Services Corporation. The ATS contract will provide Aircrew Training Devices (ATDs), to include but not limited to Weapon System Trainers (WSTs), Boom Operator Trainers (BOTs), Fuselage Trainers (FuTs), and Part-Task Trainers (PTTs) at each Main Operating Base (MOB) and the

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force	Date: May 2021
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Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 0401221F / <i>KC-46A Tanker Squadrons</i>	Project (Number/Name) 655271 / <i>KC-46 RDT&E</i>
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Formal Training Unit (FTU). The ATS contract will also support Distributed Mission Operations (DMO), provide aircrew instruction, develop courseware, provide logistics support, acquire a technical data package to support future competition efforts, and manage training device concurrency with the aircraft.

The MTS contract was awarded 6 Jul 2016 to The Boeing Company. The MTS acquisition focuses on designing, developing, testing, producing, and fielding an optimized training system for KC-46 maintainers by integrating various forms of training media and Maintenance Training Devices (MTDs) into a "blended" solution. This blended solution includes the appropriate mix of hardware and software, "high-fidelity" Augmented Hardware Training Devices (AHTDs), PTTs, Interactive Multimedia Instruction (IMI), and emerging technologies to meet validated Air Mobility Command (AMC) maintenance training requirements.

The FY 2022 funding request was reduced by \$25.534 million to account for the availability of prior year execution balances.

B. Accomplishments/Planned Programs (\$ in Millions)

	FY 2020	FY 2021	FY 2022
<p>Title: KC-46 Aircraft Product Development</p> <p>Description: EMD activities will be conducted to include the following types of activities: develop a commercial 767-2C aircraft upon which the KC-46 is based; develop the KC-46 military capability and integrate it into the aircraft; build four EMD aircraft; procure live fire assets; procure required Government Furnished Equipment (GFE); procure simulator and maintenance data; develop technical manuals and Type 1 training; and conduct development and operational testing.</p> <p>FY 2021 Plans: Continue product refinement, studies, ground, and flight testing in support of the KC-46 weapon system to include receiver certifications, simulator data collection, and completion of IOT&E events/reporting. Continue execution of boom telescope actuator redesign (BTAR) Engineering Change Proposal (ECP) and support other government costs associated with solution for Remote Vision System (RVS). Study, analyze, test and update documentation in order to certify and increase KC-46 capability for aerial refueling (AR) onload. Develop and release Request for Proposal for Take Off and Landing Data (TOLD) Capability Development contract action.</p> <p>FY 2022 Plans: Continue product refinement, studies, ground, and flight testing in support of the KC-46 weapon system to include receiver certifications, simulator data collection, and completion of IOT&E events/reporting. Continue execution of boom telescope actuator redesign (BTAR) Engineering Change Proposal (ECP) and support other government costs associated with solution for Remote Vision System (RVS). Study, analyze, test and update documentation in order to certify and increase KC-46 capability for aerial refueling (AR) onload. Award contract and begin work for Take Off and Landing Data (TOLD) to address deficiencies and improve capability.</p> <p>FY 2021 to FY 2022 Increase/Decrease Statement: Funding decreased due to ramp down of EMD activities and realignment of funds.</p>	0.000	31.637	12.240
<p>Title: KC-46 Trainer Product Development - Aircrew Training System (ATS)</p>	0.000	0.000	1.155

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 0401221F / KC-46A Tanker Squadrons	Project (Number/Name) 655271 / KC-46 RDT&E

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2020	FY 2021	FY 2022
<p>Description: Trainer development activities will be conducted to include the following types of activities: development and procurements of ATDs, courseware, and associated support equipment.</p> <p>FY 2021 Plans: N/A</p> <p>FY 2022 Plans: ATS Night Vision Goggles (NVG) Training.</p> <p>FY 2021 to FY 2022 Increase/Decrease Statement: Funding increased due to additional ATS NVG training requirement as determined by Requirements & Planning Council (R&PC).</p>			
<p>Title: KC-46 Test & Evaluation</p> <p>Description: Test & Evaluation (T&E) activities will be conducted to include the following types of activities: Development Test & Evaluation, Operational Test & Evaluation, Tanker Qualification, Receiver Certifications, Live Fire Test & Evaluation (LFT&E), Federal Aviation Administration (FAA) support, and other test planning and organizational support.</p> <p>FY 2021 Plans: Continue using EMD, pre-delivery production, LRIP aircraft, and/or AMC-loaned aircraft to support AR tanker-receiver certification testing, Aerial Refueling Simulator Qualifications data collection, correction of deficiencies, and other T&E activities for the KC-46. Continue RVS Government Test/Wing Aerial Refueling Pod (WARP) testing.</p> <p>FY 2022 Plans: Continue using EMD, pre-delivery production, and/or LRIP aircraft to support AR tanker-receiver certification testing, Aerial Refueling Simulator Qualifications data collection, correction of deficiencies, and other T&E activities for the KC-46. Continue Government Test for RVS and BTAR.</p> <p>FY 2021 to FY 2022 Increase/Decrease Statement: Funding increased due to increased testing for correction of deficiencies for RVS and BTAR.</p>	0.000	23.254	34.410
<p>Title: KC-46 Support</p> <p>Description: Development, integration, and demonstration of the KC-46 mission planning capability. In addition, studies and analysis to support planning activities for future efficiency initiatives, business case analyses, future tanker replacement planning, and miscellaneous Program Office support and planning. Also includes requirements such as travel, office supplies, training courses, and service contracts.</p> <p>FY 2021 Plans:</p>	0.000	3.072	6.000

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 0401221F / KC-46A Tanker Squadrons	Project (Number/Name) 655271 / KC-46 RDT&E

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2020	FY 2021	FY 2022
Continue Program Office Support and Planning.			
FY 2022 Plans: Continue Program Office Support and Planning and start Future Tanker Program Analysis of Alternatives effort.			
FY 2021 to FY 2022 Increase/Decrease Statement: Funding increased due to start of Tanker Replacement Program Analysis of Alternatives effort.			
Accomplishments/Planned Programs Subtotals	0.000	57.963	53.805

C. Other Program Funding Summary (\$ in Millions)											
<u>Line Item</u>	<u>FY 2020</u>	<u>FY 2021</u>	<u>FY 2022</u> <u>Base</u>	<u>FY 2022</u> <u>OCO</u>	<u>FY 2022</u> <u>Total</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>FY 2026</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• APAF 02 Line Item	-	2,665.299	2,380.315	-	2,380.315	-	-	-	-	-	-
KC046A: KC-46A Tanker											
• APAF 06 Line Item	-	194.189	222.023	-	222.023	-	-	-	-	-	-
000999: Initial Spares											

Remarks

D. Acquisition Strategy

The KC-46 Program acquisition strategy is to procure an existing commercial, Federal Aviation Administration (FAA) certified aircraft modified to meet USAF requirements. The KC-46 program released a final RFP on 24 Feb 2010, and entered source selection on 9 Jul 2010. The KC-46 program held a Milestone B (MS B) Defense Acquisition Board (DAB) on 23 Feb 2011, received approval to enter EMD from the Undersecretary of Defense (Acquisition, Technology and Logistics) (USD(AT&L)) on 24 Feb 2011, and awarded the KC-46 contract to Boeing on 24 Feb 2011 to develop and procure 179 KC-46 aircraft. The KC-46 contract procurement was conducted via a full and open competition per Federal Acquisition Regulation (FAR) Part 15, and resulted in a FY 2011 Engineering and Manufacturing Development (EMD) Fixed Price Incentive Firm (FPIF) contract. The EMD phase is developing, building, and testing four KC-46 aircraft, and will qualify the KC-46 as a tanker and certify pairings with receiver aircraft.

The MS B acquisition strategy planned for two LRIP lots followed by 11 Full-Rate Production (FRP) lots for a total aircraft procurement of 175 production aircraft. An update to the acquisition strategy occurred in support of MS C that increased LRIP from two to four lots, with the total aircraft buy remaining at 175 production aircraft. A Dec 2017 USD(AT&L) Acquisition Decision Memorandum expanded LRIP to include Lot 5. Another Program Deviation Report was submitted on June 8, 2020, to declare a breach to the Full Rate Production Decision. A new APB dated October 19, 2020 was approved, and a new ADM dated October 20, 2020 re-designated Lots 6 through 9 as LRIP with the total aircraft buy remaining at 175 Production aircraft (+4 EMD aircraft for a grand total of 179 aircraft).

LRIP now consists of two Firm Fixed Price (FFP) and seven FFP Not to Exceed (NTE) options (LRIP-1 Qty 7, LRIP-2 Qty 12, LRIP-3 Qty 15, LRIP-4 Qty 18, LRIP-5 Qty 15, LRIP-6 Qty 12, and LRIP-7 Qty 15). This will be followed by four (Lots 10-13) FFP production options [via NTE values + Economic Price Adjustment (EPA)]. LRIP

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 0401221F / <i>KC-46A Tanker Squadrons</i>	Project (Number/Name) 655271 / <i>KC-46 RDT&E</i>
<p>Lots 1 and 2 were awarded Aug 2016, LRIP Lot 3 was awarded Jan 2017, LRIP Lot 4 was awarded Sep 2018, LRIP Lot 5 was awarded Sep 2019, and LRIP Lots 6 and 7 were awarded Jan 2021. LRIP Lot 8 (Qty 12) is planned for award Jan 2022.</p> <p>The Aircrew Training System (ATS) acquisition strategy is to provide Aircrew Training Devices (ATDs), and associated support structure, to each Main Operating Base (MOB) and the Flying Training Unit (FTU). The ATS EMD FPIF contract with production options was conducted via a full and open competition per FAR Part 15, and awarded to FlightSafety Services Corporation in FY 2013. The ATS EMD phase will develop and procure ATDs; and will be supported with courseware, Training System Support Center, the technical data package, and support equipment to ensure system availability and concurrency with the aircraft. The first six ATS production options were exercised on 19 Aug 2015, 31 May 2017, 30 Apr 2018, 31 Mar 2019, 2 Sep 2020, and 4 Mar 2021. Lot 7 of 10 total lots is planned to be awarded in Jan 2022.</p> <p>The Maintenance Training System (MTS) acquisition strategy is to acquire Maintenance Training Devices (MTDs), and associated support structure, for two AMC active duty Regional Maintenance Training Facilities. The MTS EMD FFP contract with production options was conducted via a full and open competition per FAR Part 15, and awarded to The Boeing Company in FY 2016. The MTS EMD phase will develop and procure MTDs; and will be supported with courseware, Training System Support Center, the technical data package, and support equipment to ensure system availability and concurrency with the aircraft.</p> <p>The KC-46 Program is responsible for the development, testing, and production of a drogue-equipped, wing-mounted refueling system to meet Capability Production Document (CPD) thresholds and objectives for simultaneous refueling of two probe-equipped receivers. The system can be installed or removed from the KC-46 as mission needs dictate.</p> <p>The long-term support concept for the KC-46 is organic two-level maintenance (2LM): organization level (O-level) and depot level (D-level). For the purposes of this program, all maintenance other than O-level shall be referred to as D-level. The product support strategy will initially employ Interim Contractor Support (ICS) before transitioning to a 100% organically-managed maintenance and supply support capability. Performance Based Logistics (PBL) solutions will be evaluated during EMD as viable approaches to facilitate the transition.</p>		

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 0401221F / KC-46A Tanker Squadrons	Project (Number/Name) 655271 / KC-46 RDT&E
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Product Development (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
KC-46A aircraft non-recurring development, integration, and testing; 4 RDT&E tanker aircraft; and support	C/FPIF	The Boeing Company : Seattle, WA	0.000	-		31.637	May 2021	7.377	Apr 2022	-		7.377	-	-	-
KC-46A Take Off and Landing Data (TOLD) Development Capability	SS/TBD	The Boeing Company : Seattle, WA	0.000	-		-		4.863	Aug 2022	-		4.863	-	-	-
KC-46A Aircrew Training System	C/FPIF	Flight Safety Services Co : Centennial, CO	0.000	-		0.000	Apr 2021	1.155	Jun 2022	-		1.155	-	-	-
Subtotal			0.000	-		31.637		13.395		-		13.395	-	-	N/A

Remarks
The KC-46 EMD contract was awarded 24 Feb 2011. The total cost represents the current Program Office Estimate (POE) which accounts for the ceiling price of the contract plus the financial and schedule risk of potential design changes for the KC-46 aircraft.

FINANCIAL PERFORMANCE: The KC-46 is evaluated against traditional Research and Development (R&D) program expenditure benchmarks. Unlike many traditional R&D programs, the KC-46 EMD contract is a FPIF contract with progress payments. Twenty percent of incurred costs are withheld until the end of the contract, when they are liquidated. Mandatory funding obligations and progress payment withholds will cause the program to lag traditional expenditure benchmarks, painting an inaccurate portrait of overall program health.

Support (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
KC-46A studies and analysis associated with the development, integration, and demonstration of KC-46 capability & future planning	C/CPAF	Various : Various	0.000	-		3.072	Aug 2021	6.000	Jun 2022	-		6.000	-	-	-
Subtotal			0.000	-		3.072		6.000		-		6.000	-	-	N/A

Remarks
These contracts are on an as needed basis, with various contract types and performing activities.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 0401221F / KC-46A Tanker Squadrons	Project (Number/Name) 655271 / KC-46 RDT&E
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Test and Evaluation (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
KC-46A testing and planning support of development & operational test, FAA & military certification, and aircraft qualification activities	Various	Various : Various	0.000	-		15.385	Mar 2021	23.309	Nov 2021	-		23.309	-	-	-
KC-46A Long Term Test Aircraft Maintenance Support	SS/CPAF	The Boeing Company : Edwards AFB, CA	0.000	-		7.869	Aug 2021	11.101	Mar 2022	-		11.101	-	-	-
Subtotal			0.000	-		23.254		34.410		-		34.410	-	-	N/A

Remarks
Integrated testing and planning activities are performed by government organizations, with some contractor technical subject matter experts and teaming with the prime contractor.

	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	0.000	-	57.963	53.805	-	53.805	-	-	N/A

Remarks
In FY2021, PE 0605221F KC-46, Project 655271 KC-46 RDT&E, and Project 651120 Pegasus Capability Improvements efforts were transferred to PE 401221F, Project 655271 KC-46 RDT&E, and Project 651120 Pegasus Capability Improvements in order to consolidate all KC-46 activity under a single PE. PE 0401221F also has historical Tanker Replacement costs from FY 2005-2008 reflected in prior years. PE 0605221F has costs from FY2009 to FY2020.

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Exhibit R-4A, RDT&E Schedule Details: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 0401221F / <i>KC-46A Tanker Squadrons</i>	Project (Number/Name) 655271 / <i>KC-46 RDT&E</i>
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Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
KC-46				
Initial Operational Test & Evaluation (WARPs)	1	2022	3	2022
Government Testing for Correction of Deficiencies	1	2021	4	2024
Boom Telescope Actuator Redesign ECP	1	2021	4	2023
Aircrew Training System Development & Updates	1	2021	4	2023
Take Off and Landing Data (TOLD)	4	2022	4	2025
Long Term Test Aircraft Maintenance Support (LTTAMS)	1	2021	4	2022

Note
Events prior to Q1 2021 are reflected in PE 0605221F. Funding moved to PE 0401221F in FY 2021.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 0401310F / <i>C-32 Executive Transport Recapitalization</i>
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COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
Total Program Element	-	0.062	0.000	0.000	0.000	0.000	-	-	-	-	-	-
654019: <i>C-32 Executive Transport Recap</i>	-	0.062	0.000	0.000	0.000	0.000	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-	-	-

Note
FY18 Prior Year Funding of 2.918 million was executed in PE 0401310F, BPAC 654019, BA05.

In FY 2021, PE 0401310F, C-32 Executive Transport Recapitalization, Project 654019, BA 05, efforts were transferred to PE 0401310F, C-32 Executive Transport Recapitalization, Project 650009, BA 04, in order to reflect the appropriate Budget Activity.

A. Mission Description and Budget Item Justification

The C-32A mission is to provide Executive Airlift transportation for the First Lady, Vice President, Cabinet, Congress, and foreign Heads of State. The C-32A also serves as the backup to the VC-25 Presidential support aircraft.

The C-32 Executive Transport Recapitalization program was intended to replace the aging C-32A aircraft fleet. The Air Force and Navy were engaged in an effort to recapitalize the National Military Command System fixed-wing aircraft and large capacity Executive Airlift fleets. The aircraft consist of the Air Force E-4B National Airborne Operations Center (NAOC), Air Force C-32A Executive Airlift (EA), and the Navy E-6B Airborne Command Post (ABNCP) and Take Charge and Move Out (TACAMO) aircraft. These platforms are aging and increasingly difficult to support. The combined effort explored the realignment of missions among platforms and examined the potential benefits of acquiring common airframes without sacrificing operational effectiveness or increasing overall costs. This effort was called the NEAT (NNAOC, EEA, A ABNCP, TTACAMO) Analysis of Alternatives (AoA) and it concluded in September 2020 with no impact or actions for the C-32 fleet.

Prior year budgets supported funding to complete a joint service AoA in collaboration with the E-4B and E-6B Recapitalization programs to explore commonality of the airframe and interoperability of the mission equipment. Continued funding would have established the Program Office and matured the development of the acquisition strategy. Funding would have also supported cost/performance trade studies and risk reduction activities.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver the C-32 Executive Transport Recapitalization system capability. The use of such programs funds would be in addition to the civilian pay expenses budgeted in program element 0605831F. In FY 2020 \$0.000 million was expended for civilian pay expenses in this program element, and in FY 2021 \$0.000 million is forecasted for civilian pay expenses in this program element.

This program is in Budget Activity 5, System Development and Demonstration (SDD) because it has passed Milestone B approval and is conducting engineering and manufacturing development tasks aimed at meeting validated requirements prior to full rate production.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600: Research, Development, Test & Evaluation, Air Force I BA 5: System Development & Demonstration (SDD)	R-1 Program Element (Number/Name) PE 0401310F I C-32 Executive Transport Recapitalization
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B. Program Change Summary (\$ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Previous President's Budget	9.930	0.000	0.000	0.000	0.000
Current President's Budget	0.062	0.000	0.000	0.000	0.000
Total Adjustments	-9.868	0.000	0.000	0.000	0.000
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	-9.505	0.000			
• SBIR/STTR Transfer	-0.363	0.000			
• Other Adjustments	0.000	0.000	0.000	0.000	0.000

Change Summary Explanation

FY 2021 funding reduced by \$9.868 million due to a Reprogramming Action of \$9.505 million and Small Business Innovation Research for \$0.363 million.

C. Accomplishments/Planned Programs (\$ in Millions)

	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Title: C-32 Executive Transport Recapitalization Analysis of Alternatives	0.000	0.000	0.000	0.000	0.000
Description: Continue AoA activities to assess potential materiel solutions and inform the Material Development Decision (MDD) to mitigate current capability gaps.					
FY 2021 Plans: N/A					
FY 2022 Base Plans: N/A					
FY 2022 OCO Plans: N/A					
FY 2021 to FY 2022 Increase/Decrease Statement: N/A					
Title: C-32 Executive Transport Recapitalization Program Office Standup	0.062	0.000	0.000	0.000	0.000
Description: Continue standup of Program Office to support AoA closeout and early acquisition activities.					

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force	Date: May 2021
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Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 0401310F / <i>C-32 Executive Transport Recapitalization</i>
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C. Accomplishments/Planned Programs (\$ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
FY 2021 Plans: N/A					
FY 2022 Base Plans: N/A					
FY 2022 OCO Plans: N/A					
FY 2021 to FY 2022 Increase/Decrease Statement: N/A					
Accomplishments/Planned Programs Subtotals	0.062	0.000	0.000	0.000	0.000

D. Other Program Funding Summary (\$ in Millions)

N/A

Remarks

E. Acquisition Strategy

The C-32A Executive Transport Recapitalization effort acquisition strategy will be fully developed after the JROC mission realignment decision and the determination of a Material Development Decision (MDD).

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Exhibit R-4, RDT&E Schedule Profile: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 0401310F / C-32 Executive Transport R ecapitalization	Project (Number/Name) 654019 / C-32 Executive Transport Recap

	FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
C-32 Recap																												
Program Office Standup																												
AoA Study Planning																												
RFI Event #2																												
Mission Realignment Review																												
AoA																												
Acquisition Strategy Development																												
Post AoA MDD																												
Staff Report																												
JROC Mission Realignment Report																												

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Exhibit R-4A, RDT&E Schedule Details: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 0401310F / C-32 Executive Transport R ecapitalization	Project (Number/Name) 654019 / C-32 Executive Transport Recap

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
C-32 Recap				
Program Office Standup	1	2020	3	2021
AoA Study Planning	1	2020	2	2020
RFI Event #2	1	2020	2	2020
Mission Realignment Review	2	2020	3	2020
AoA	1	2020	3	2020
Acquisition Strategy Development	2	2020	4	2020
Post AoA MDD	3	2020	4	2020
Staff Report	3	2020	4	2020
JROC Mission Realignment Report	3	2020	4	2020

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force / BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 0401319F / VC-25B
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COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
Total Program Element	1,780.498	730.183	799.429	680.665	0.000	680.665	-	-	-	-	-	-
655250: VC-25B	1,780.498	730.183	799.429	680.665	0.000	680.665	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-	-	-

Program MDAP/MAIS Code: 425

Note
 FY10-14 Prior Years Funding \$27.29M was executed in PE 0401314F, BPAC 675355

A. Mission Description and Budget Item Justification

The VC-25B Program, formerly known as the Presidential Aircraft Recapitalization (PAR) Program, will replace the Presidential VC-25A fleet which faces capability gaps, rising maintenance costs, and parts obsolescence as it ages beyond 30 years. The VC-25B Program Office will deliver a new fleet of aircraft to meet the requirements for the President to execute the duties of Head of State, Chief Executive, and Commander-in-Chief. The VC-25B Program will uniquely modify two Boeing 747-8 commercial aircraft to provide the President, staff, and guests with safe and reliable air transportation with the equivalent level of communications capability and security available in the White House. The modifications to the 747-8 aircraft will include an electrical power upgrade with dual Auxiliary Power Units that are usable in flight, a mission communication system, a work and rest environment, an executive interior, military avionics, a self-defense system, autonomous enplaning and deplaning, and autonomous baggage loading. No significant changes to the existing VC-25A Concept of Operations or Concept of Employment are expected.

In August 2012, the Defense Acquisition Executive (DAE), as the VC-25B Milestone Decision Authority, approved the Materiel Development Decision. The Capability Development Document (CDD) was validated by the Joint Requirements Oversight Council in November 2014. In January 2015, the Secretary of the Air Force's Determination and Findings designated the Boeing 747-8 aircraft as the airframe platform, and the DAE's Acquisition Decision Memorandum authorized Pre-Milestone B (Pre-MS B) contracts aimed at improving affordability and reducing program execution risk. In February 2015, the Assistant Secretary of the Air Force for Acquisition approved a Justification and Approval designating Boeing as the sole source for Pre-MS B activities; and Post-MS B design, integration, modification, and test activities. The DAE approved the initial acquisition strategy in September 2015. MS B certification occurred in September 2016. In March 2017, the White House reaffirmed the minimum set of requirements necessary to meet Presidential mission needs; these requirements are codified in the March 2017 CDD. The DAE approved the updated acquisition strategy and the Acquisition Program Baseline (APB) in December 2018.

This budget supports Post-MS B design, integration, modification, and test of two aircraft to make them Presidential mission ready. In FY20, the program continued Engineering and Manufacturing development (EMD) activities to include design integration and start of aircraft modification, as well as test planning and initiation of Product Support (PS) activities. In FY21 and FY22, the program continues EMD activities to include modification, test, and PS activities.

Funds may be used to lease test equipment, as well as address emerging and short-notice Diminishing Manufacturing Sources and Material Shortage (DMSMS) issues.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force	Date: May 2021
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Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 0401319F / VC-25B
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This program element may include necessary civilian pay expenses required to manage, execute, and deliver VC-25B system capability. The use of such programs funds would be in addition to the civilian pay expenses budgeted in program element 0605831F. In FY20 \$2.992M was expended for civilian pay expenses in this program element, and in FY21 \$3.356M is forecasted for civilian pay expenses in this program element.

This program is in Budget Activity 5, System Development and Demonstration (SDD); however, it will not enter full rate production as stated below.

This program is in Budget Activity 5, System Development and Demonstration (SDD) because it has passed Milestone B approval and is conducting engineering and manufacturing development tasks aimed at meeting validated requirements prior to full rate production.

B. Program Change Summary (\$ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Previous President's Budget	757.923	800.889	584.585	0.000	584.585
Current President's Budget	730.183	799.429	680.665	0.000	680.665
Total Adjustments	-27.740	-1.460	96.080	0.000	96.080
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	-27.740	0.000			
• Other Adjustments	0.000	-1.460	96.080	0.000	96.080

Change Summary Explanation

The decrease in FY20 was for Small Business Innovation Research (SBIR).

The decrease in FY21 was the VC-25B program share of a \$48.6M Congressional undistributed mark applied across the Air Force RTD&E portfolio.

The increase in FY22 is due to re-phasing funds in the FYDP to align to program requirements and fully funding the program to the service cost position.

C. Accomplishments/Planned Programs (\$ in Millions)	FY 2020	FY 2021	FY 2022
Title: VC-25B EMD, Product Support, & Program Management Administration (PMA)	727.647	793.396	664.756
Description: Execute EMD activities and accomplish PMA to support the Program Office. FY22 will continue EMD activities such as the management, integration, modification, test/verification, certification, and product support to deliver two Presidential mission-ready VC-25B Aircraft and utilize modeling and simulation, system integration labs (SILs), and mockups to assist in design, modification, and test events.			

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force	Date: May 2021
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Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force / BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 0401319F / VC-25B
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C. Accomplishments/Planned Programs (\$ in Millions)	FY 2020	FY 2021	FY 2022
<p><i>FY 2021 Plans:</i> Funds in FY 2021 continue EMD activities, aircraft modification, test, and product support activities, as well as support PMA.</p> <p><i>FY 2022 Plans:</i> Funds in FY 2022 will continue EMD activities, aircraft modification, test and product support activities, as well as support PMA with transition from EMD activities to Developmental Test and Evaluation (DT&E), and the ramp up of product support activities.</p> <p><i>FY 2021 to FY 2022 Increase/Decrease Statement:</i> The decrease in funding is due to the transition from EMD activities to Developmental Test and Evaluation (DT&E).</p>			
<p><i>Title:</i> VC-25B Government Test</p> <p><i>Description:</i> Government test activities to prepare for, oversee, and conduct test events.</p> <p><i>FY 2021 Plans:</i> Funds in FY 2021 are for conducting test planning with participating test organizations and contractors and to participate in verification testing in SILs, contractor facilities and government facilities, as well as aircraft functional checkout.</p> <p><i>FY 2022 Plans:</i> Funds in FY2022 will be used to conduct flight, ground, and SIL testing with the participating test organizations and contractors. The tests to be conducted include taxi, first flight, type certification and mission systems.</p> <p><i>FY 2021 to FY 2022 Increase/Decrease Statement:</i> The increase in funding is due to the program leaving the flight test planning stage and entering into flight test. Flight test operations require a significant growth in funding due to the level of effort required to support test operations.</p>	2.536	6.033	15.909
Accomplishments/Planned Programs Subtotals	730.183	799.429	680.665

D. Other Program Funding Summary (\$ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
• MILCON PE 0401319F: <i>PAR Facilities</i>	86.000	-	-	-	-	-	-	-	-	-	-
• OPAF 03 Lineitem 843050: <i>PAR Mechanized Material Handling Equip</i>	-	-	-	-	-	-	-	-	-	-	-
• OPAF 03 Lineitem 8347240: <i>PAR CCTV/Audiovisual Equipment</i>	-	-	-	-	-	-	-	-	-	-	-

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force	Date: May 2021
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Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 0401319F / VC-25B
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D. Other Program Funding Summary (\$ in Millions)

<u>Line Item</u>	<u>FY 2020</u>	<u>FY 2021</u>	<u>FY 2022</u> <u>Base</u>	<u>FY 2022</u> <u>OCO</u>	<u>FY 2022</u> <u>Total</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>FY 2026</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• OPAF 03 Lineitem 837300: <i>PAR Base Comm Infrastructure</i>	4.010	-	-	-	-	-	-	-	-	-	-
• OPAF 02 823990: <i>Special Purpose Vehicles</i>	-	0.499	2.580	-	2.580	-	-	-	-	-	-
• O&M O&M: PE 0401319F: <i>PAR Furnishings and Equipment</i>	-	1.951	-	-	-	-	-	-	-	-	-

Remarks

E. Acquisition Strategy

The Defense Acquisition Executive (DAE), as the VC-25B Milestone Decision Authority, approved the initial VC-25B Acquisition Strategy in September 2015. The DAE approved the updated VC-25B Acquisition Strategy and set the APB in December 2018. The VC-25B Program will integrate technologically mature subsystems into two Government furnished, commercial Boeing 747-8 aircraft. The VC-25B Program will design, integrate, modify, and test two aircraft to make them Presidential mission ready. Boeing is the prime integrator for VC-25B development activities. The VC-25B Program has a single sole-source firm-fixed-price contract with multiple major contract modifications. Modifications include risk reduction activities, 747-8 commercial aircraft purchase, Preliminary Design (PD), Engineering and Manufacturing Development (EMD), and Product Support. The contract for risk reduction activities was awarded in January 2016. The contract modification to purchase two commercial aircraft was awarded in August 2017. The contract modification for PD was awarded in September 2017. The contract modification for EMD was awarded in July 2018. The initial contract modification for Product Support activities was awarded in April 2020.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Air Force												Date: May 2021				
Appropriation/Budget Activity				R-1 Program Element (Number/Name)				Project (Number/Name)								
3600 / 5				PE 0401319F / VC-25B				655250 / VC-25B								
Product Development (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total				
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract	
VC-25B Contract Activities	SS/FFP	The Boeing Company : Various	1,743.071	716.464	Oct 2019	777.831	Oct 2020	650.255	Oct 2021	-		650.255	-	-	-	
Subtotal			1,743.071	716.464		777.831		650.255		-		650.255	-	-	N/A	
Support (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total				
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract	
Direct Cite Authority Civilian Pay	Various	AFLCMC/WV : WPAFB, OH	0.000	2.992	Nov 2019	3.356	Nov 2020	-		-		-	-	-	-	
Subtotal			0.000	2.992		3.356		-		-		-	-	-	N/A	
Test and Evaluation (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total				
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract	
VC-25B Developmental Test and Evaluation	MIPR	412 TW, JITC : Various	2.835	2.536	Dec 2019	6.033	Dec 2020	15.909	Dec 2021	-		15.909	-	-	-	
Subtotal			2.835	2.536		6.033		15.909		-		15.909	-	-	N/A	
Management Services (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total				
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract	
VC-25B PMA Other Government Costs	Various	AFLCMC/WV : WPAFB, OH	18.007	2.296	Nov 2019	6.090	Nov 2020	10.088	Nov 2021	-		10.088	-	-	-	
VC-25B PMA Contract Services	C/T&M	AFLCMC/WV : WPAFB, OH	16.585	5.895	Feb 2020	6.119	Feb 2021	4.413	Feb 2022	-		4.413	-	-	-	
Subtotal			34.592	8.191		12.209		14.501		-		14.501	-	-	N/A	

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 0401319F / VC-25B	Project (Number/Name) 655250 / VC-25B
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	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	1,780.498	730.183	799.429	680.665	-	680.665	-	-	N/A

Remarks
 FY 2010-2014 RDT&E Funding (\$27.3M) was executed in PE 0401314F, Project 675355, BA07.

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Exhibit R-4, RDT&E Schedule Profile: PB 2022 Air Force **Date: May 2021**

Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 0401319F / VC-25B	Project (Number/Name) 655250 / VC-25B
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	FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
VC-25B																												
EMD																												
CDR																												
Aircraft Modification																												
Product Support Activities																												
Developmental Test (DT)																												
Familiarization and Operational Test (FAM/OT)																												
Required Assets Available (RAA) for Initial Operational Capability (IOC)																												
RAA for Full Operational Capability (FOC)																												

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Exhibit R-4A, RDT&E Schedule Details: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 0401319F / VC-25B	Project (Number/Name) 655250 / VC-25B

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
VC-25B				
EMD	1	2020	2	2025
CDR	2	2020	2	2020
Aircraft Modification	2	2020	2	2024
Product Support Activities	3	2020	2	2025
Developmental Test (DT)	1	2022	4	2023
Familiarization and Operational Test (FAM/OT)	3	2024	4	2024
Required Assets Available (RAA) for Initial Operational Capability (IOC)	4	2024	4	2024
RAA for Full Operational Capability (FOC)	2	2025	2	2025

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 0701212F / <i>Automated Test Systems</i>
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COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
Total Program Element	-	2.685	10.654	15.445	0.000	15.445	-	-	-	-	-	-
6506TE: <i>Test And Evaluation Support Budget Authority</i>	-	2.685	10.654	15.445	0.000	15.445	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-	-	-

Program MDAP/MAIS Code: 6506

Note

The Automatic Test System program office is responsible for developing, acquiring and sustaining Automatic Test Systems for the United States Air Force (USAF).

The Bomber Armament Tester is replacing six legacy testers and combining their capabilities into one tester. The Bomber Armament Tester will support the B-2, B-1 and B-52 platforms.

The Common Aircraft Portable Reprogramming Equipment (CAPRE) is a secure common Memory Loader Verifier (MLV) that loads operational flight programs for 32 USAF weapons systems. Weapon Systems include but are not limited to A-10, B-1, B-52, C-5, C-17, C-130, CV-22, F-15, F-16, H-60 and KC-46.

A. Mission Description and Budget Item Justification

The Bomber Armament Tester (BAT) will ensure the USAF bomber fleet can conduct nuclear deterrence, global power projection and global strike operations to support the President of the United States and Combatant Commanders by providing a reliable, cyber secure, and sustainable tester. The tasks are to develop a common bomber armament tester and the Test Program Sets (Software, Hardware, and Documentation) to test the armament release equipment on the bombers.

RDT&E efforts support development, testing, and producibility of the Bomber Armament Tester and Test Program Sets. The program will utilize an incremental development approach with B-2 as Increment 1, B-1 as Increment 2, and B-52 as Increment 3.

The Common Aircraft Portable Reprogramming Equipment (CAPRE) Secure Memory Loader Verifier (SMLV) is a secure common memory loader verifier that loads operational flight programs to the weapon systems. CAPRE SMLV leads the fleet on Cyber initiatives and is government owned and developed. CAPRE SMLV supports 45 Mission Design Series (MDS) including but not limited to A-10, B-1, B-52, C-5, C-17, C-130, CV-22, F-15, F-16, H-60 and KC-46.

This RDT&E effort includes developing a Network Interface Module (NIM) that provides additional cyber hardening to the CAPRE system and redesigning the current CAPRE system to adapt to the NIM. Additionally this RDT&E effort includes software development for NIM interfaces and new weapons systems moving to the CAPRE system from other MLV systems. The goal is to provide one common cyber secure MLV for the Air Force to minimize cyber vulnerabilities in weapon systems.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force	Date: May 2021
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Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 0701212F / <i>Automated Test Systems</i>
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The Common Armament Tester-Fighter (CAT-F) provides a common reliable, cyber resilient, nuclear certified and sustainable armament tester for the USAF Combat Fighter Aircraft (A-10, F-15, F-16, F-22 and MQ-9 Platforms). Currently there are 14 unique testers supporting six fighter aircraft; 1009 total testers, requiring 10M annually to sustain each tester and their respective program management support structure. Availability of current testers averages 60%; legacy preload testers for A-10 & F-16 cannot meet requirements in MIL-STD-1760.

RDT&E efforts support prototype development and testing of the Common Armament Tester Fighter and Test Program Sets.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver Automatic Test Systems Program Office weapon system capability. The use of such programs funds would be in addition to the civilian pay expenses budgeted in program element 0605831F. In FY19 \$0.000M, FY20 \$0.000M, and FY21 \$0.000M was expended for civilian pay expenses in this program element.

The FY22 funding request was reduced by \$0.984M to account for the availability of prior year execution balances.

This program element also includes program administrative cost for the Automatic Test Systems program office and funds the cost of studies and research to support the Automatic Test Systems fleet.

This program is in Budget Activity 5, System Development and Demonstration (SDD) because it has passed Milestone B approval and is conducting engineering and manufacturing development tasks aimed at meeting validated requirements prior to full rate production.

B. Program Change Summary (\$ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Previous President's Budget	2.787	10.673	15.506	0.000	15.506
Current President's Budget	2.685	10.654	15.445	0.000	15.445
Total Adjustments	-0.102	-0.019	-0.061	0.000	-0.061
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	0.000	0.000			
• Other Adjustments	-0.102	-0.019	-0.061	0.000	-0.061

Change Summary Explanation

No significant changes

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force	Date: May 2021
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Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 0701212F / <i>Automated Test Systems</i>
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C. Accomplishments/Planned Programs (\$ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
<p>Title: Bomber Armament Tester</p> <p>Description: New Common Bomber Armament Tester for B-1, B-2, and B-52. RDT&E efforts support development, testing, and producibility of the Bomber Armament Tester and Test Program Sets.</p> <p>FY 2021 Plans: Increments 1-3 (B-2, B-1, B-52)RDT&E efforts support development, testing, and producibility of the Bomber Armament Tester and Test Program Sets.</p> <p>FY 2022 Base Plans: RDT&E efforts support development, testing, and producibility of the Bomber Armament Tester and Test Program Sets.</p> <p>FY 2022 OCO Plans: N/A</p> <p>FY 2021 to FY 2022 Increase/Decrease Statement: FY21 to FY22 decrease is due to the development of the Bomber Armament Tester nearing the completion of development and starting the early phases of production.</p>	0.000	8.265	4.438	0.000	4.438
<p>Title: Common Aircraft Portable Reprogramming Equipment (CAPRE)</p> <p>Description: Development of a common cyber secure Memory Loader Verifier for the Air Force.</p> <p>FY 2021 Plans: FY21/22 3600 RDT&E funds needed to complete the development of the CAPRE SMLV that allows secure transfer of operational flight program (OFP) on 45 Mission Design Series (MDS). This includes software development and interfaces for the CAPRE SMLV.</p> <p>Funds are also needed to continue the development efforts and all costs associated with the development of this program, which is phased and funded incrementally.</p> <p>FY 2022 Base Plans: FY21/22 3600 RDT&E funds needed to complete the development of the CAPRE SMLV that allows secure transfer of operational flight program (OFP) on 32 supported aircraft. This includes software development and interfaces for the CAPRE SMLV.</p>	2.685	2.389	11.007	0.000	11.007

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 0701212F / <i>Automated Test Systems</i>
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C. Accomplishments/Planned Programs (\$ in Millions)

	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Funds are also needed to continue the development efforts and all costs associated with the development of this program, which is phased and funded incrementally.					
FY 2022 OCO Plans: N/A					
FY 2021 to FY 2022 Increase/Decrease Statement: Funds increased due to budget cuts that the program sustained in FY20 and 21 as a result of Un-Billed Balance Issues with the OEM on the CAPRE SMLV program and due to schedule delays and cost overruns on the BAT program, hence creating a funding shortfall for the program.					
Accomplishments/Planned Programs Subtotals	2.685	10.654	15.445	0.000	15.445

D. Other Program Funding Summary (\$ in Millions)

<u>Line Item</u>	<u>FY 2020</u>	<u>FY 2021</u>	<u>FY 2022 Base</u>	<u>FY 2022 OCO</u>	<u>FY 2022 Total</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>FY 2026</u>	<u>Cost To Complete</u>	<u>Total Cost</u>
• APAF 07 00071: <i>Replacement Support Equipment</i>	13.600	27.311	27.392	-	27.392	-	-	-	-	-	-

Remarks
 Other program funding includes procurement funds for Bomber Armament Tester Program, the Common Aircraft Portable Reprogrammable Equipment Secure Memory Loader Verifier and Aircraft Smart Weapons Test Set (ASWTS).

E. Acquisition Strategy

Acquisition Strategy for the Bomber Armament Tester (BAT) was approved by AFPEO/ Agile Combat Support on 12 November 2015. The BAT program will use an incremental approach based on customer needs to satisfy this requirement. Increment 1 includes the development of the core test set, the B-2A requirements and development of the most complex B-1B and B-52 test program sets. Increment 2 consist of the B-1B development and Increment 3 consists of the B-52H requirements. The BAT program will utilize full and open competition to award the contract. Contract awarded September 28, 2017.

The Acquisition strategy for Common Aircraft Portable Reprogrammable Equipment (CAPRE) Secure Memory Loader Verifier (SMLV) is to use the original government manufacturer to develop the NIM, software and hardware development. Acquisition Strategy for CAPRE was approved by the Milestone Decision Authority in June 2017.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Air Force											Date: May 2021				
Appropriation/Budget Activity 3600 / 5						R-1 Program Element (Number/Name) PE 0701212F / Automated Test Systems					Project (Number/Name) 6506TE / Test And Evaluation Support Budget Authority				

Product Development (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Product Development	C/CPAF	Not specified. : TBD	-	-		-		0.000		-		0.000	-	-	-
CAPRE/CAPRE SMLV Development	PO	309th OO-ALC : UT	-	2.168	Oct 2019	2.389	Jan 2021	-		-		-	-	-	-
BAT Development / Cost Overruns	C/CPAF	Not specified. : CA	-	-		8.265	Oct 2020	3.450	Oct 2021	-		3.450	-	-	-
Subtotal			-	2.168		10.654		3.450		-		3.450	-	-	N/A

Remarks
 Product Development Cost include the development of the Bomber Armament Test Sets (Units under test Software, hardware and Technical Data), Technical Data and maintenance of Government Furnished Equipment.

Development efforts include developing a Network Interface Module (NIM) that provides additional cyber hardening to the CAPRE system and redesigning the current CAPRE system to adapt to the NIM. Development effort also include software development for NIM interfaces and new weapons systems moving to the CAPRE system from other MLV systems. The goal is to provide one common cyber secure MLV for the Air Force.

Test and Evaluation (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Test and Evaluation	C/CPAF	Not specified. : TBD	-	-		-		3.062	Oct 2021	-		3.062	-	-	-
Development and Operation Testing support	C/CPIF	Not specified. : NV	-	-		-		8.933	Oct 2021	-		8.933	-	-	-
Subtotal			-	-		-		11.995		-		11.995	-	-	N/A

Remarks
 Environmental testing of the Bomber Armament Tester and operational testing of the test program sets for the B-2 and most complex B-1 and B-52.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 0701212F / Automated Test Systems	Project (Number/Name) 6506TE / Test And Evaluation Support Budget Authority
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Management Services (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Management Services	C/CPAF	Not specified. : TBD	-	0.000		-		-		-		-	-	-	-
BAT Travel	Various	Not specified. : NV	-	0.000		-		-		-		-	-	-	-
BAT Program Management Support	C/FFP	Not specified. : NV	-	0.000		-		-		-		-	-	-	-
CAPRE/CAPRE SMLV Travel	Various	Not specified. : NV	-	0.025	Sep 2020	-		-		-		-	-	-	-
CAPRE/ CAPRE SMLV Program Management Support	C/FFP	Not specified. : NV	-	0.492	Jun 2020	-		-		-		-	-	-	-
Subtotal			-	0.517		-		-		-		-	-	-	N/A

Remarks
PMA costs include travel to support the development of the Bomber Armament Tester. PMA cost also include an Information Assurance expert, Assistance and advisory service contractors to provide support to the program office during the development of the program. The program element may include necessary civilian pay expenses required to manage, execute and deliver Automatic Test System capability.

	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	-	2.685	10.654	15.445	-	15.445	-	-	N/A

Remarks

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Exhibit R-4A, RDT&E Schedule Details: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 0701212F / <i>Automated Test Systems</i>	Project (Number/Name) 6506TE / <i>Test And Evaluation Support Budget Authority</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
Automatic Test Systems				
BAT Milestone C Decision	4	2022	4	2022
Inc 2 EMD B-1B TPS	3	2021	1	2023
Inc 3 EMD B-52 TPS	1	2023	1	2025
TPS FIAT (PCA/FCA)	3	2021	2	2022
CAPRE Block 40/50 Design Development Gates	4	2020	4	2020
DT/OT	1	2021	4	2021
CAPRE Block 30 Design Development Gates	1	2020	1	2021

Note

Bomber Armament Tester (BAT) is a nuclear certified common tester capable of testing on-aircraft Stores Management Systems and Line Replacement Units both on- and off-aircraft. The BAT System will test functionality of the Armament Mission Equipment (AME) that is required for B-2A, B-1B, and B-52H weapons delivery. The BAT schedule reflects Increments I, II, AND III. Due to an increase in material cost and lack of access to needed Government Furnished Property (GFP) to the Original Equipment Manufacturer (OEM), the BAT program is experiencing major schedule delays which is causing the program to overrun the projected cost. Program re-baselined at the beginning of FY21 to stabilize program costs and schedule.

FY22 funds will be used for Engineering & Manufacture Design (EMD) phases for Increments I, II, and III. Without FY22 3600 funding, EMD and integration will be stopped, and BAT development and integration will be further delayed.

The Common Aircraft Portable Reprogramming Equipment (CAPRE) Secure Memory Loader Verifier (SMLV) a is government designed and developed memory loader verifier (MLV) to replace the aging F-16 unique MLV and legacy CAPRE equipment. FY22 funds will be used for Engineering & Manufacture Design (EMD) of the CAPRE SMLV to ensure a cyber-secure MLV to maximize readiness for 18 platforms.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 0804772F / <i>Training Developments</i>
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COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
Total Program Element	-	0.000	4.471	4.482	0.000	4.482	-	-	-	-	-	-
652400: <i>Training Developments</i>	-	0.000	4.471	4.482	0.000	4.482	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Pilot Training Next (PTN) offers a more effective approach to pilot training. New training technologies will be studied and validated. Results will be used by Air Education and Training Command to develop processes and procedures to increase pilot production, improve and streamline existing training programs, and to incorporate into other programs.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver PTN weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program element 0605831F.

Alignment to the NDS: PTN is part of a complete redesign of pilot training using cutting edge technology to provide a faster, more cost effective and more comprehensive training model to get the warfighter to the cockpit in half the time of the existing model.

Funding contained in this documentation directly aids Air Education and Training Command's flying training enterprise to continue its overall Future Years Defense Program pilot production increase starting in FY 2020, thus reducing the USAF Pilot Shortage.

This program is in Budget Activity 5, System Development and Demonstration (SDD) because it has passed Milestone B approval and is conducting engineering and manufacturing development tasks aimed at meeting validated requirements prior to full rate production.

B. Program Change Summary (\$ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Previous President's Budget	0.000	4.479	4.550	0.000	4.550
Current President's Budget	0.000	4.471	4.482	0.000	4.482
Total Adjustments	0.000	-0.008	-0.068	0.000	-0.068
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	0.000	0.000			
• Other Adjustments	0.000	-0.008	-0.068	0.000	-0.068

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force	Date: May 2021
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Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 0804772F / <i>Training Developments</i>
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C. Accomplishments/Planned Programs (\$ in Millions)	FY 2020	FY 2021	FY 2022
<p>Title: Pilot Training Next (PTN) Development</p> <p>Description: Pilot Training Next currently utilizes eight (8) T-6B aircraft equipped with heads-up and advanced situational awareness displays. Mission computers were temporarily modified to enable Air-to-Air and Air-to-Ground simulated weapons delivery. Numerous Virtual Reality (VR) Immersive Training Devices (ITDs) are also being utilized in the training curriculum. The aircraft and VR ITDs enable proper assessment of advanced pilot training concepts, techniques, procedures, and capabilities, while also providing a flexible architecture that incorporates Live, Virtual, and Constructive (LVC) elements into undergraduate pilot training.</p> <p>Efforts will be focused on validating new LVC and VR ITD concepts to develop processes and procedures to increase pilot production, improve and streamline existing undergraduate pilot training programs.</p> <p>FY 2021 Plans: Continue experimentation with the T-6B aircraft configured in the Textron BP2+ software package. Begin development and prototyping of T-6A avionics modifications as it relates to real-time data capture and advanced competency instruction within PTN. Further refine VR ITD capabilities.</p> <p>FY 2022 Plans: Continue development of T-6A avionics modifications as it relates to real-time data capture and advanced competency instruction within PTN. Continue experimentation with the T-6B aircraft configured in the Textron BP2+ software package. Further refine VR ITD capabilities.</p> <p>FY 2021 to FY 2022 Increase/Decrease Statement: Funding increased to due economic adjustment.</p>	0.000	4.471	4.482
Accomplishments/Planned Programs Subtotals	0.000	4.471	4.482

D. Other Program Funding Summary (\$ in Millions)
N/A

Remarks

E. Acquisition Strategy
Program Office(s) will select their own acquisition strategies based on Air Education and Training Command's innovation unit (Detachment 24) requirements. The initial systems PTN is primarily focused on are small-scale avionics modifications to the T-6A aircraft and incorporating Virtual Reality Immersive Training Devices into the undergraduate pilot training curriculum.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 0804772F / Training Developments	Project (Number/Name) 652400 / Training Developments
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Product Development (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Pilot Training Next Contracts	Various	AFLCMC : TBD	-	-		3.121	Jun 2021	3.111	Jun 2022	-		3.111	-	-	-
Subtotal			-	-		3.121		3.111		-		3.111	-	-	N/A

Test and Evaluation (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Pilot Training Next Test Activities	TBD	TBD : TBD	-	-		0.150		0.152		-		0.152	-	-	-
Subtotal			-	-		0.150		0.152		-		0.152	-	-	N/A

Management Services (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Program Management Administrative Support	TBD	Not specified. : TBD	-	-		0.450	Jan 2021	0.457	Jan 2022	-		0.457	-	-	-
Administrative and Advisory Services Support	TBD	Not specified. : TBD	-	-		0.650	Mar 2021	0.660	Mar 2022	-		0.660	-	-	-
Government Travel	Various	Not specified. : TBD	-	-		0.100	Jan 2021	0.102	Jan 2022	-		0.102	-	-	-
Subtotal			-	-		1.200		1.219		-		1.219	-	-	N/A

	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals		-	-	4.471	4.482	-	-	-	N/A

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 0804772F / <i>Training Developments</i>	Project (Number/Name) 652400 / <i>Training Developments</i>
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FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

<i>Pilot Training Next Studies</i>	
Pilot Training Next Systems Development	[REDACTED]

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Exhibit R-4A, RDT&E Schedule Details: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 0804772F / <i>Training Developments</i>	Project (Number/Name) 652400 / <i>Training Developments</i>
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Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>Pilot Training Next Studies</i>				
Pilot Training Next Systems Development	2	2021	4	2026

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force</i> / BA 5: <i>System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 0901299F / AF A1 Systems
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COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
Total Program Element	-	0.000	7.453	0.000	0.000	0.000	-	-	-	-	-	-
650007: <i>The Inspector Generals Instructional and Informational Readiness System (TIGIIRS)</i>	-	0.000	7.453	0.000	0.000	0.000	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The DAF Inspector General Instructional and Informational Readiness System Next Generation (TIGIIRS NG) system will develop a single, standardized and integrated process for for planning, executing, reporting & analyzing Wing Performance and Readiness. It enables the IG to efficiently accomplish 10USC8020 responsibility to "report upon the discipline, efficiency and economy of the Air Force" and those responsibilities directed by SecAF & CSAF in Readiness Review Task #26.

The legacy capability is built upon a MAJCOM-generated architecture that was transitioned to a program of record in FY10 as an interim gapping solution. The legacy system is not sustainable beyond FY24. This funding provides for the development foundation of the Next Gen System.

This program element may include necessary emergent or unanticipated civilian pay expenses required to manage, execute, and deliver AFIPPS capability. The use of such programs funds would be in addition to the civilian pay expenses budgeted in program element 0605831F. In FY20 \$0.000M was expended for civilian pay expenses in this program element, and in FY21 \$0.000M is forecasted for civilian pay expenses in this program element.

This program is in Budget Activity 5, System Development and Demonstration (SDD) because it has passed Milestone B approval and is conducting engineering and manufacturing development tasks aimed at meeting validated requirements prior to full rate production.

B. Program Change Summary (\$ in Millions)	<u>FY 2020</u>	<u>FY 2021</u>	<u>FY 2022 Base</u>	<u>FY 2022 OCO</u>	<u>FY 2022 Total</u>
Previous President's Budget	0.000	8.467	0.000	0.000	0.000
Current President's Budget	0.000	7.453	0.000	0.000	0.000
Total Adjustments	0.000	-1.014	0.000	0.000	0.000
• Congressional General Reductions	0.000	-1.014			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	0.000	0.000			
• Other Adjustments	0.000	0.000	0.000	0.000	0.000

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force	Date: May 2021
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Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 0901299F / AF A1 Systems
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Change Summary Explanation

FY21 - \$1.014M Congressional General Reduction

C. Accomplishments/Planned Programs (\$ in Millions)

	FY 2020	FY 2021	FY 2022
<p>Title: Develop The Inspector Generals Instructional and Informational Readiness System (TIGIIRS)</p> <p>Description: The RDT&E funds will be used for development efforts against requirements that were finalized through a BCAC (Business Capability Acquisition Cycle) Business Process Mapping and Re-engineering (BPM/BPR). Funds multiple prototypes of the BPM/BPR identified functional capabilities. These prototypes will be provided to AFLCMC/HI by selected contractors through a competitive BCAC selection process. These prototypes will form the foundation of the Next Gen system.</p> <p>FY 2021 Plans: Identification/Definition of IT Functional Requirements & Information Assets, conduct Market Analysis, prototyping viable IT solution concepts, development of initial Cybersecurity Strategy, evaluation for compliance with Clinger Cohen Act, assessment of technical solution approaches, stakeholder demonstrations & evaluations, and AFLCMC Program Management.</p> <p>FY 2022 Plans: N/A</p> <p>FY 2021 to FY 2022 Increase/Decrease Statement: Funding decreased due to all current projected activities being funded in FY21.</p>	0.000	7.453	0.000
Accomplishments/Planned Programs Subtotals	0.000	7.453	0.000

D. Other Program Funding Summary (\$ in Millions)

N/A

Remarks

E. Acquisition Strategy

The DAF Inspector General Instructional and Informational Readiness System Next Generation (TIGIIRS NG) system will provide a single, standardized and integrated process for for planning, executing, reporting & analyzing Wing Performance and Readiness.

The legacy capability is built upon a MAJCOM-generated architecture that was transitioned to a program of record in FY10 as an interim gapping solution. The legacy system is not sustainable beyond FY24. This funding provides for the development foundation of the Next Gen System.

New capability will focus on enhanced readiness, inspection event scheduling and planning, inspection event management, and increased situational awareness of the DAF's mission readiness level in near real-time.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Air Force											Date: May 2021				
Appropriation/Budget Activity 3600 / 5				R-1 Program Element (Number/Name) PE 0901299F / AF A1 Systems				Project (Number/Name) 650007 / The Inspector Generals Instructional and Informational Readiness System (TIGIIRS)							

Product Development (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Identification/Definition of IT Functional Requirements & Information Assets	Various	AFLCMC : San Antonio/Lackland, TX	-	0.000		1.120	Feb 2021	0.000		-		0.000	-	-	-
Development of initial Cybersecurity Strategy	Reqn	AFLCMC : San Antonio/Lackland, TX	-	0.000		0.750	Mar 2021	0.000		-		0.000	-	-	-
Subtotal			-	0.000		1.870		0.000		-		0.000	-	-	N/A

Support (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
AFLCMC Program Management	Various	AFLCMC : San Antonio/Lackland, TX	-	0.000		0.863	Nov 2020	0.000		-		0.000	-	-	-
Travel	Various	AFLCMC : San Antonio/Lackland, TX	-	0.000		0.210	Oct 2020	0.000		-		0.000	-	-	-
Subtotal			-	0.000		1.073		0.000		-		0.000	-	-	N/A

Test and Evaluation (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Market Analysis	C/CPAF	AFLCMC : San Antonio/Lackland, TX	-	0.000		0.250	Dec 2020	0.000		-		0.000	-	-	-
Prototyping of viable IT solution concepts	C/CPAF	AFLCMC : San Antonio/Lackland, TX	-	0.000		1.220	Jan 2021	0.000		-		0.000	-	-	-
Clinger Cohen Act compliance evaluation	C/CPAF	AFLCMC : San Antonio/Lackland, TX	-	0.000		0.400	Jun 2021	0.000		-		0.000	-	-	-
Stakeholder demonstrations & evaluations	C/CPAF	AFLCMC : San Antonio/Lackland, TX	-	0.000		0.430	Jul 2021	0.000		-		0.000	-	-	-

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Exhibit R-4A, RDT&E Schedule Details: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 0901299F / AF A1 Systems	Project (Number/Name) 650007 / The Inspector Generals Instructional and Informational Readiness System (TIGIIRS)

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>IG Instructional & Informational Readiness System (TIGIIRS- Next Gen)</i>				
AFLCMC Program Management	1	2021	4	2021
Identification/Definition of IT Functional Requirements & Information Assets	2	2021	2	2021
Market Analysis	1	2021	2	2021
Prototyping of viable IT solution concepts	2	2021	2	2021
Development of initial Cybersecurity Strategy	2	2021	3	2021
Clinger Cohen Act compliance evaluation	3	2021	4	2021
Assessment of technical solution approaches	3	2021	4	2021
Stakeholder demonstrations & evaluations	4	2021	4	2021
Travel	1	2021	4	2021

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 1203176F / <i>Combat Survivor Evader Locator</i>
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COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
Total Program Element	-	1.949	0.000	0.000	0.000	0.000	-	-	-	-	-	-
654522: <i>CSAR EMD</i>	-	1.949	0.000	0.000	0.000	0.000	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-	-	-

A. Mission Description and Budget Item Justification

In FY 2021, funding in PE 1203176F, Combat Survivor Evader Locator is transferred to PE 0305176F, Combat survivor Evader Locator.

The Combat Survivor Evader Locator (CSEL) System provides aircrews with end-to-end global satellite secure emergency communication capability during combat and peace-time flying operations. CSEL provides a hand held radio as part of the mandatory aircrew survival gear. CSEL is a joint program (AF, Army, and Navy) and is the DoD program of record for personnel recovery survival radios. CSEL supports four of five Personnel Mission Phases: Report, Locate, Support, and Recover.

A National Security Agency (NSA) Cryptographic Modernization mandate and the Ultra High Frequency Follow-On satellite constellation are at the end of life and are driving upgrades to base stations. This effort includes development to modernize the system to integrate common waveforms, integrate broadcast reception for non-CSEL devices, provide for cryptographic modernization, leverage software defined capabilities based on the FY16 cryptographic study, and to procure intellectual property. CSEL will leverage software defined capabilities to replace the legacy handheld radio with a new device that supports report, locate, and recovery missions. The new device will leverage technological advancements and efficiencies to develop a more intuitive device that enables secure communication between the joint warfighter and rescue support teams. This funding will also be used to perform various studies and analysis in support of the CSEL Enterprise.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver CSEL capabilities. The use of such program funds would be in addition to the civilian pay expenses budgeted in program elements 0605826F, 0605827F, 0605828F, 0605829F, 0605830F, 0605831F, 0605832F, 0605898F, and 0605833F.

This program is in Budget Activity 5, System Development and Demonstration (SDD) because it has passed Milestone B approval and is conducting engineering and manufacturing development tasks aimed at meeting validated requirements prior to full rate production.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force	Date: May 2021
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Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 1203176F / <i>Combat Survivor Evader Locator</i>
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B. Program Change Summary (\$ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Previous President's Budget	2.000	0.000	0.000	0.000	0.000
Current President's Budget	1.949	0.000	0.000	0.000	0.000
Total Adjustments	-0.051	0.000	0.000	0.000	0.000
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	0.000	0.000			
• Other Adjustments	-0.051	0.000	0.000	0.000	0.000

Change Summary Explanation

FY 2021: Funding transferred to PE 0305176F.

C. Accomplishments/Planned Programs (\$ in Millions)	FY 2020	FY 2021	FY 2022
<p>Title: CSEL Next Generation Cryptographic Architecture (NGCA)</p> <p>Description: A NSA cryptographic modernization mandate and the Ultra High Frequency Follow-On satellite constellation at end of life are both driving upgrades to CSEL Base Stations and Interrogation Module.</p> <p>FY 2021 Plans: N/A</p> <p>FY 2022 Plans: N/A</p>	0.949	0.000	0.000
<p>Title: CSEL Next Generation Survival Communication Device</p> <p>Description: A NSA cryptographic modernization mandate and the Ultra High Frequency Follow-On satellite constellation at end of life are both driving upgrades to 60,000 handheld CSEL rescue radios.</p> <p>FY 2021 Plans: N/A</p> <p>FY 2022 Plans:</p>	1.000	0.000	0.000

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 1203176F / <i>Combat Survivor Evader Locator</i>
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C. Accomplishments/Planned Programs (\$ in Millions)	FY 2020	FY 2021	FY 2022
N/A			
Accomplishments/Planned Programs Subtotals	1.949	0.000	0.000

D. Other Program Funding Summary (\$ in Millions)											
Line Item	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
• RDTE 05 0305176F: <i>Combat Survivor Evader Locator</i>	-	0.973	-	-	-	-	-	-	-	-	-

Remarks
 Funding for this effort transfers to PE 0305176F in FY2021.

E. Acquisition Strategy
 The CSEL overall strategy is competition focused. The Technical Data Package is being acquired under the NGCA contract to allow future competition of the CSEL Enterprise. CSEL is furthering competition by partnering with Air Force Research Lab (AFRL). AFRL will develop a Next Gen Survival Communication Device to deliver an innovative materiel solution to the Joint Services. A modular solution requires engagement with multiple development partners to insert modern technologies compatible with a modernized CSEL System.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 1203176F / <i>Combat Survivor Evader Locator</i>	Project (Number/Name) 654522 / <i>CSAR EMD</i>
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Support (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
AIRWorks Next Generation Cryptographic Architecture (NGCA) Support	MIPR	NAVAIR : Saint Inigoes, MD	-	0.949	Dec 2019	-		-		-		-	-	-	-
AFRL Device Support	TBD	AFRL : TBD	-	1.000	May 2020	-		-		-		-	-	-	-
Subtotal			-	1.949		-		-		-		-	-	-	N/A

	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals		-	1.949	0.000	-	-	-	-	N/A

Remarks
Please refer to the Performance Base Budget Overview Book for information on how Air Force resources are applied and how those resources are contributing to Air Force performance goals and most importantly, how they contribute to our mission.

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Exhibit R-4, RDT&E Schedule Profile: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 1203176F / <i>Combat Survivor Evader Locator</i>	Project (Number/Name) 654522 / <i>CSAR EMD</i>

FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

CSEL Next Generation Cryptographic Architecture (NGCA)	
CSEL NGCA Test & Evaluation (T&E)	
CSEL Next Generation Survival Communication Device (NGSCD)	
CSEL NGSCD Development	

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Exhibit R-4A, RDT&E Schedule Details: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 1203176F / <i>Combat Survivor Evader Locator</i>	Project (Number/Name) 654522 / <i>CSAR EMD</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
CSEL Next Generation Cryptographic Architecture (NGCA)				
CSEL NGCA Test & Evaluation (T&E)	1	2020	4	2020
CSEL Next Generation Survival Communication Device (NGSCD)				
CSEL NGSCD Development	2	2020	4	2020

Note
In FY 2021, funds transfer to PE 0305176F

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 1203269F / <i>GPS III Follow-On (GPS IIIIF)</i>
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COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
Total Program Element	639.475	427.210	0.000	0.000	0.000	0.000	-	-	-	-	-	-
653170: <i>GPS IIIIF</i>	639.475	427.210	0.000	0.000	0.000	0.000	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-	-	-

Program MDAP/MAIS Code: 590

A. Mission Description and Budget Item Justification

In FY2021, PE 1203269F, GPS III Follow-On (GPS IIIIF) efforts were transferred to Appropriation 3620, Research, Development, Test & Evaluation, Space Force, PE 1203269SF GPS III Follow-On (GPS IIIIF) from Appropriation 3600, Budget Activity 5 due to the creation of a new Appropriation for Space Force.

The Global Positioning System (GPS) is a space-based navigation system that fills validated Joint Service requirements for worldwide, accurate, common grid three-dimensional positioning/navigation for military aircraft, ships, and ground personnel. The consistent accuracy, unaffected by location or weather and available in real time, significantly improves effectiveness of reconnaissance, weapons delivery, mine countermeasures and rapid deployment for all services. GPS must comply with Title 10 United States Code (USC) Sec. 2281, which requires that the Secretary of Defense ensures the continued sustainment and operation of GPS for military and civilian purposes, and 51 USC Sec. 50112, which requires that GPS complies with certain standards and facilitates international cooperation.

The system is composed of three segments: User Equipment (funded under Program Element (PE) 1203164F), Space (funded under PE 1203265F, 1203165F, and 1203269F), and a Control Network (funded under PE 1206423F and 1203165F). The satellites broadcast high-accuracy data using precisely synchronized signals that are received and processed by user equipment installed in military platforms. The user equipment computes the platform position and velocity and provides steering vectors to target locations or navigation waypoints. The control segment provides daily updates to the navigation messages broadcast from the satellites to maintain system precision in three dimensions to 16 meters (spherical error probable) worldwide. Additionally, GPS supports the United States Nuclear Detonation (NUDET) Detection System (USNDS) mission and provides strategic and tactical support to the following Department of Defense (DoD) missions: Joint Operations by providing capabilities for Positioning, Navigation, and Timing (PNT); Command, Control, Communications, and Intelligence (C3I); Special Operations; Military Operations in Urban Terrain (MOUT); Defense-Wide Mission Support (DWMS); Air Mobility; and Space Launch Orbital Support.

GPS IIIIF delivers GPS III satellites beyond the first ten Space Vehicles (SVs) being delivered by the GPS III program (funded in PE 1203265F GPS III Space Segment). The GPS IIIIF satellites maintain the same capabilities as the GPS III satellites, but also deliver significant enhancements to include: backward compatibility, unified S-Band (USB) interface compliance, integration of hosted payloads including a redesigned USNDS payload, Laser Retro-reflector Arrays (LRAs), Search and Rescue/GPS (SAR/GPS) and Energetic Charged Particles (ECP) sensor, and Regional Military Protection (RMP) capabilities that provide the ability to deliver high-power regional Military Code (M-Code) signals in specific areas of intended effect. Implementation of RMP into the GPS Enterprise requires integration with the ground and user segments, executed by the GPS Next Generation Operational Control System (OCX), along with the Military GPS User Equipment (MGUE) programs, respectively. The SAR/GPS payload provided by Canada fills a validated National Search and Rescue Committee requirement to provide enduring, space-based distress alerting capability to detect, locate, and relay distress alerts to fulfill its responsibilities under international agreements for Search and Rescue. LRA, built by the Naval Research

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force	Date: May 2021
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Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 1203269F / <i>GPS III Follow-On (GPS IIIIF)</i>
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Lab (NRL), is a passive reflector that improves accuracy and provides better ephemeris data. National Geospatial-Intelligence Agency (NGA) funds the integration costs of the LRA.

This PE funds the Research, Development, Test, and Evaluation (RDT&E) of GPS IIIIF SVs 11-12 (to include Non-Recurring Engineering (NRE) support efforts). This program includes risk-reducing simulators and systems engineering associated with delivering the new capabilities required of GPS IIIIF satellites.

Space acquisition must respond with speed and agility to emerging adversary threats. Space & Missile Systems Center (SMC) has transformed the organization and implementation of space acquisition to an enterprise approach, maximizing innovation and resiliency, leveraging international, commercial, and mission partnerships, and managing program/project priorities according to an integrated unclassified/classified enterprise space architecture. Expanding the appropriate acquisition authorities and contract mechanisms to deliver capability sooner, SMC will strategically execute experimentation, prototyping, risk reduction, and other efforts to develop new or repurpose capabilities.

This PE may include necessary civilian pay expenses required to manage, execute, and deliver GPS IIIIF Space Segment weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in PEs 1206392F and 1206398F.

This program is in Budget Activity 5, System Development and Demonstration (SDD) because it has passed Milestone B approval and is conducting engineering and manufacturing development tasks aimed at meeting validated requirements prior to full rate production.

B. Program Change Summary (\$ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Previous President's Budget	447.875	0.000	0.000	0.000	0.000
Current President's Budget	427.210	0.000	0.000	0.000	0.000
Total Adjustments	-20.665	0.000	0.000	0.000	0.000
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	-5.092	0.000			
• SBIR/STTR Transfer	-15.573	0.000			
• Other Adjustments	0.000	0.000	0.000	0.000	0.000

Change Summary Explanation

FY 2020: -5.092M decrease for higher Air Force Space priorities

C. Accomplishments/Planned Programs (\$ in Millions)	FY 2020	FY 2021	FY 2022
Title: GPS III Follow-On (GPS IIIIF) Development	427.210	0.000	-

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force	Date: May 2021
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Appropriation/Budget Activity 3600: Research, Development, Test & Evaluation, Air Force I BA 5: System Development & Demonstration (SDD)	R-1 Program Element (Number/Name) PE 1203269F I GPS III Follow-On (GPS IIIIF)
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C. Accomplishments/Planned Programs (\$ in Millions)	FY 2020	FY 2021	FY 2022
<p>Description: The program utilizes RDT&E funds to develop and deliver SVs 11-12, conduct the NRE of develop risk-reducing simulators, developing support test equipment, and conducting the systems engineering associated with delivering the new capabilities required of GPS IIIIF including backward compatibility, dual band Telemetry, Tracking, and Control (TT&C), integration of Government Furnished Equipment (GFE) hosted payloads, and RMP, which delivers high power regional M-Code signals in specific areas of intended effect.</p> <p>FY 2021 Plans: N/A</p> <p>FY 2021 to FY 2022 Increase/Decrease Statement: N/A</p>			
Accomplishments/Planned Programs Subtotals	427.210	0.000	-

D. Other Program Funding Summary (\$ in Millions)											
<u>Line Item</u>	<u>FY 2020</u>	<u>FY 2021</u>	<u>FY 2022</u> <u>Base</u>	<u>FY 2022</u> <u>OCO</u>	<u>FY 2022</u> <u>Total</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>FY 2026</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• SPAF 01 GPS03C: GPSIII Follow On	389.975	0.000	0.000	-	0.000	-	-	-	-	-	-
• RDTE 07 1203265F: GPS III Space Segment	47.178	0.000	0.000	-	0.000	-	-	-	-	-	-
• SPAF 01 GPSIII: GPS III Space Segment	34.845	0.000	0.000	-	0.000	-	-	-	-	-	-

Remarks

E. Acquisition Strategy

In December 2017, Principal Deputy Office of the Assistant Secretary of the Air Force (Acquisition & Logistics) declared the GPS IIIIF program a new start beginning in FY 2019 and, consistent with the Fiscal Year 2016 National Defense Authorization Act (NDAA), the program was categorized as an Acquisition Category (ACAT) (1B) Major Defense Acquisition Program (MDAP) with the Service Acquisition Executive (SAE) serving as the Milestone Decision Authority (MDA). During this time, the MDA approved the second phase of the two-phased GPS III Follow-On acquisition strategy. Executed using funds in PE 1203265F, GPS III Space Segment, the Phase 1 Production Readiness Feasibility Assessments conducted during FY 2016-2017 provided data and insight into contractors' GPS satellite production designs with emphasis on a mature navigation payload and production-ready designs. Phase 1 results affirmed the viability of a competitive approach for Phase 2. The Phase 2 strategy directed the Air Force to conduct a full-and-open competition for GPS IIIIF space vehicles and specified the use of RDT&E funds to deliver SVs 11-12 and conduct associated NRE. In addition to SVs 11-12, the RDT&E effort will be comprised of developing risk-reducing simulators, support test equipment, and conducting the systems engineering associated with delivering the new capabilities required of GPS IIIIF. The Air Force awarded the contract to Lockheed Martin in September

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force Date: May 2021

Appropriation/Budget Activity	R-1 Program Element (Number/Name)
3600: <i>Research, Development, Test & Evaluation, Air Force I BA 5: System Development & Demonstration (SDD)</i>	PE 1203269F / <i>GPS III Follow-On (GPS III F)</i>

2018 and began the 1-year CDR campaign in March 2019. Completion of CDR was done in March 2020 and Milestone C certification completed in July 2020. The Air Force will procure SV 13+ via annual contract options exercised using Space Procurement, Air Force (SPAF) 3021 and Procurement, Space Force (SPSF) 3022 funds consistent with full-funding policy under an annual buy approach.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 1203269F / GPS III Follow-On (GPS III F)	Project (Number/Name) 653170 / GPS III F
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Product Development (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
GPS III F Development	C/FPIF	Lockheed Martin : Littleton, CO	562.932	391.650	Dec 2019	-		-		-		-	-	-	-
GPS III F Technical Mission Analysis	MIPR	Various : Various	9.134	4.823	Dec 2019	-		-		-		-	-	-	-
GPS III F Enterprise SE&I	C/CPAF	SAIC : El Segundo, CA	19.440	17.101	Dec 2019	-		-		-		-	-	-	-
Subtotal			591.506	413.574		-		-		-		-	-	-	N/A

Test and Evaluation (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
GPS III F Test and Evaluation	Various	Various : Various	1.140	3.717	Mar 2020	-		-		-		-	-	-	-
Subtotal			1.140	3.717		-		-		-		-	-	-	N/A

Management Services (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
GPS III F FFRDC	MIPR	Aerospace Corp : El Segundo, CA	6.836	2.759	Dec 2019	-		-		-		-	-	-	-
GPS III F A&AS	Various	Various : El Segundo, CA	39.332	6.390	Dec 2019	-		-		-		-	-	-	-
GPS III F Other Support	Various	Various : El Segundo, CA	0.661	0.770	Oct 2019	-		-		-		-	-	-	-
Subtotal			46.829	9.919		-		-		-		-	-	-	N/A

	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	639.475	427.210	0.000	-	-	-	-	-	N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 1203269F / GPS III Follow-On (GPS III F)	Project (Number/Name) 653170 / GPS III F
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	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
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Remarks
 FINANCIAL PERFORMANCE: GPS III F is evaluated against traditional Research and Development (R&D) program expenditure benchmarks. However, unlike many traditional R&D programs, the GPS III F R&D and Production phases fall under a Fixed Price Incentive Firm Target (FPIF) contract type with progress payments. Mandatory funding obligations and progress payment withholds will cause the program to lag traditional expenditure benchmarks, painting an inaccurate portrait of overall program health.

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Exhibit R-4, RDT&E Schedule Profile: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 1203269F / GPS III Follow-On (GPS III F)	Project (Number/Name) 653170 / GPS III F

	FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
GPS III F																												
GPS III F CDR																												
GPS III F Milestone C																												
GSS 1 & 2 Subsystem Procurement & Build																												
GNST+ Subsystem Procurement & Build																												
SV11 Subsystem Procurement & Build																												
SV12 Subsystem Procurement & Build																												

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Exhibit R-4A, RDT&E Schedule Details: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 1203269F / GPS III Follow-On (GPS III F)	Project (Number/Name) 653170 / GPS III F

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
GPS III F				
GPS III F CDR	1	2020	2	2020
GPS III F Milestone C	3	2020	3	2020
GSS 1 & 2 Subsystem Procurement & Build	1	2020	4	2020
GNST+ Subsystem Procurement & Build	1	2020	4	2020
SV11 Subsystem Procurement & Build	1	2020	4	2020
SV12 Subsystem Procurement & Build	1	2020	4	2020

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force / BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 1203940F / <i>Space Situation Awareness Operations</i>
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COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
Total Program Element	-	51.749	0.000	0.000	0.000	0.000	-	-	-	-	-	-
65A037: <i>Ground Based Optical Sensor System (GBOSS)</i>	-	51.749	0.000	0.000	0.000	0.000	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-	-	-

A. Mission Description and Budget Item Justification

In FY2021, PE 1203940F, Space Situational Awareness Operations efforts were transferred to Appropriation 3620, Research, Development, Test & Evaluation, Space Force, PE 1203940SF Space Situation Awareness Operations from Appropriation 3600, Budget Activity 05 due to the creation of a new Appropriation for Space Force.

Space Situational Awareness (SSA) is knowledge of all aspects of space related to operations. As the foundation for space control, SSA encompasses surveillance of all space objects and activities; detailed surveillance of specific space assets; monitoring space environmental conditions; monitoring cooperative space assets; gathering indications and warning on adversary space operations; and conducting integrated command, control, communications, processing, analysis, dissemination, and archiving activities. This program element fields, upgrades, operationalizes, operates and maintains Air Force sensors and information integration capabilities within the SSA network while companion program element 1206425F, Space Situational Awareness Systems, develops new network sensors and improved information integration capabilities across the network. Funds also support efforts such as engineering studies and analyses, architectural engineering studies, trade studies, technology needs forecasting, modernization initiatives, systems engineering, system development, and test & evaluation, and may include prototyping and technology demonstration. Activities funded in this program element (1203940F) focus on surveillance of objects in earth orbit to aid tasks including satellite tracking; space object identification; tracking and cataloging; satellite attack warning; notification of satellite flyovers to U.S. forces; space treaty monitoring; and technical intelligence gathering.

Space acquisition must respond with speed and agility to emerging adversary threats. Space & Missile Systems Center (SMC) is transforming the organization and implementation of space acquisition to an enterprise approach, maximizing innovation and resiliency, leveraging international, commercial, and mission partnerships, and managing program/project priorities according to an integrated unclassified/classified enterprise space architecture. Expanding the appropriate acquisition authorities and contract mechanisms to deliver capability sooner, SMC will strategically execute experimentation, prototyping, risk reduction, and other efforts to develop new or repurpose capabilities.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver Ground Based Optical Sensor System (GBOSS) capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program elements 1206392F and 1206398F.

This program is in Budget Activity 5, System Development and Demonstration (SDD) because it has passed Milestone B approval and is conducting engineering and manufacturing development tasks aimed at meeting validated requirements prior to full rate production.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force	Date: May 2021
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Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 1203940F / <i>Space Situation Awareness Operations</i>
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B. Program Change Summary (\$ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Previous President's Budget	56.829	0.000	0.000	0.000	0.000
Current President's Budget	51.749	0.000	0.000	0.000	0.000
Total Adjustments	-5.080	0.000	0.000	0.000	0.000
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	-3.000	0.000			
• SBIR/STTR Transfer	-2.080	0.000			
• Other Adjustments	0.000	0.000	0.000	0.000	0.000

Change Summary Explanation

FY 2020: -\$3.000M decrease for higher Air Force Space priorities.

C. Accomplishments/Planned Programs (\$ in Millions)	FY 2020	FY 2021	FY 2022
Title: Ground Based Optical Sensor System (GBOSS)	51.749	0.000	0.000
Description: GBOSS provides global ground based optical sensor capability for Space Situational Awareness (SSA). GBOSS improves sensitivity, search rate, tracking of non-cooperative launches, precise tagging of clustered objects, and detection of closely spaced dim objects. This effort includes fielding GBOSS capabilities in optimal global locations, upgrading existing Ground-based Electro-Optical Deep Space Surveillance (GEODSS) sensors to improve sensitivity and search rates, and may acquire new advanced technology sensor(s) to improve global electro-optical sensor resilience and persistence. The effort will coordinate with Combined Space Operations Center (CSpOC), National Space Defense Center (NSDC), and National Air and Space Intelligence Center (NASIC) efforts to ensure enterprise data fusion and dissemination supporting Enterprise Space Battle Management Command, and Control (ESBMC2).			
FY 2021 Plans: N/A			
FY 2022 Plans: N/A			
Accomplishments/Planned Programs Subtotals	51.749	0.000	0.000

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force Date: May 2021

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 1203940F / <i>Space Situation Awareness Operations</i>
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D. Other Program Funding Summary (\$ in Millions)

N/A

Remarks

E. Acquisition Strategy

Program established as an FY 2018 new start to address ground-based optical SSA gaps and shortfalls in supporting the Space Warfighting Construct (SWC). The acquisition strategy approved by AFPEO/SP in March 2018 accelerates the development and fielding of the solution, minimizing the time to address the requirements in light of current and emerging threats. Initial technology maturation and risk reduction will be executed using existing DoD, IC, and lab contracts. TMRR and EMD effort will be executed on a new contract awarded through full and open competition. The approved acquisition strategy supports fielding Initial Operational Capability (IOC) in the European theater in 2023 and Final Operational Capability (FOC) of the global capability in 2024.

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Exhibit R-4, RDT&E Schedule Profile: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 1203940F / <i>Space Situation Awareness Operations</i>	Project (Number/Name) 65A037 / <i>Ground Based Optical Sensor System (GBOSS)</i>

FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

GBOSS Phase I Development	
GBOSS TMRR	

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Exhibit R-4A, RDT&E Schedule Details: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 1203940F / <i>Space Situation Awareness Operations</i>	Project (Number/Name) 65A037 / <i>Ground Based Optical Sensor System (GBOSS)</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>GBOSS Phase I Development</i>				
GBOSS TMRR	1	2020	4	2020

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force / BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 1206421F / <i>Counterspace Systems</i>
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COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
Total Program Element	-	26.246	0.000	0.000	0.000	0.000	-	-	-	-	-	-
65A001: <i>Counter Satellite Communications System</i>	-	19.228	0.000	0.000	0.000	0.000	-	-	-	-	-	-
65A005: <i>Offensive Counterspace (OCS) C2</i>	-	5.127	0.000	0.000	0.000	0.000	-	-	-	-	-	-
65A013: <i>BOUNTY HUNTER</i>	-	1.891	0.000	0.000	0.000	0.000	-	-	-	-	-	-

A. Mission Description and Budget Item Justification

In FY 2021, PE 1206421F, Counterspace Systems efforts were transferred to Appropriation 3620, Research, Development, Test & Evaluation, Space Force, PE 1206421SF Counterspace Systems from Appropriation 3600, Budget Activity 05 due to the creation of a new Appropriation for Space Force.

Acquisition Decision Memorandum (ADM) April 24th 2009, directed all capabilities identified in the October 4th 2006, Counter Communications System (CCS) Block 20, Joint Requirements Oversight Council (JROC) approved Capability Development Document (CDD) shall be accomplished as Pre-planned Product Improvement Program (P3I) upgrades to the CCS Block 10. On April 11th 2016, Air Force Space Command (AFSPC) updated ADM adding additional responsibility for CCS Block 10.3 Meadowlands.

CCS provides expeditionary, deployable, reversible offensive space control (OCS) effects applicable across the full spectrum of conflict. It prevents adversary Satellite Communications (SATCOM) in Area of Responsibility (AOR) including Command & Control (C2), Early Warning and Propaganda, and hosts Rapid Reaction Capabilities in response to Urgent Needs. This program effort includes architecture engineering and studies, system hardware design and development, software design and integration, and testing and demonstration of capabilities to provide disruption of satellite communications signals.

Space Acquisition must respond with speed and agility to emerging adversary threats. Space & Missile Systems Center (SMC) is transforming the organization and implementation of space acquisition to an enterprise approach, maximizing innovation and resiliency, leveraging international, commercial, and mission partnerships, and managing program/project priorities according to an integrated unclassified/classified enterprise space architecture. Expanding the appropriate acquisition authorities and contract mechanisms to deliver capability sooner, SMC will strategically execute experimentation, prototyping, risk reduction, and other efforts to develop new or repurpose capabilities.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver Counterspace weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program elements 1206392F and 1206398F.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force	Date: May 2021
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Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 1206421F / <i>Counterspace Systems</i>
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Bounty Hunter (BH) supports the Defensive Space Control of US systems in a specific AOR and provides the capacity to prevent effective adversary use of Command, Control, Communications, Computers, and Intelligence (C4I). Continuing annual agile development is needed to meet new user needs in an ever changing threat environment.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver Bounty Hunter weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program elements 0605831F.

This program is in Budget Activity 5, System Development and Demonstration (SDD) because it has passed Milestone B approval and is conducting engineering and manufacturing development tasks aimed at meeting validated requirements prior to full rate production.

B. Program Change Summary (\$ in Millions)	<u>FY 2020</u>	<u>FY 2021</u>	<u>FY 2022 Base</u>	<u>FY 2022 OCO</u>	<u>FY 2022 Total</u>
Previous President's Budget	27.037	0.000	0.000	0.000	0.000
Current President's Budget	26.246	0.000	0.000	0.000	0.000
Total Adjustments	-0.791	0.000	0.000	0.000	0.000
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	-0.791	0.000			
• Other Adjustments	0.000	0.000	0.000	0.000	0.000

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force										Date: May 2021		
Appropriation/Budget Activity 3600 / 5					R-1 Program Element (Number/Name) PE 1206421F / <i>Counterspace Systems</i>				Project (Number/Name) 65A001 / <i>Counter Satellite Communications System</i>			
COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
65A001: <i>Counter Satellite Communications System</i>	-	19.228	0.000	0.000	0.000	0.000	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

In FY 2021, PE 1206421F, Counter Satellite Communications System efforts were transferred to Appropriation 3620, Research, Development, Test & Evaluation, Space Force, PE 1206421SF Counter Satellite Communications System from Appropriation 3600, Budget Activity [05] due to the creation of a new Appropriation for Space Force.

Acquisition Decision Memorandum (ADM) April 24th 2009, directed all capabilities identified in the Oct 4th 2006 CCS Block 20, Joint Requirements Oversight Council (JROC) approved Capability Development Document (CDD) shall be accomplished as Pre-planned Product Improvement Program (P3I) upgrades to the Counter Communications System (CCS) Block 10. On April 11th 2016, Air Force Space Command (AFSPC) A5/A8/A9 signed and updated ADM adding additional responsibility for CCS Block 10.3 Meadowlands.

CCS provides expeditionary, deployable, reversible offensive space control (OCS) effects applicable across the full spectrum of conflict. It prevents adversary Satellite Communications (SATCOM) in Area of Responsibility (AOR) including Command & Control (C2), Early Warning and Propaganda, and hosts Rapid Reaction Capabilities in response to Urgent Needs. This program effort includes architecture engineering and studies, system hardware design and development, software design and integration, and testing and demonstration of capabilities to provide disruption of satellite communications signals.

JETSS is the Counterspace Command and Control (C2) system for mission planning and execution monitoring currently in use at the Combined Space operations Center (CSpOC) Special Technical Operations (STO) Cell.

B. Accomplishments/Planned Programs (\$ in Millions)

	FY 2020	FY 2021	FY 2022
Title: Counter Communications System (CCS) Pre-planned Product Improvement (P3I) Program	19.228	0.000	0.000
Description: Develop, integrate, test and field the CCS P3I program. This is an incremental approach to deliver Block 20 CCS capabilities.			
FY 2021 Plans: N/A			
FY 2022 Plans: N/A			
Accomplishments/Planned Programs Subtotals	19.228	0.000	0.000

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 1206421F / <i>Counterspace Systems</i>	Project (Number/Name) 65A001 / <i>Counter Satellite Communications System</i>

C. Other Program Funding Summary (\$ in Millions)

<u>Line Item</u>	<u>FY 2020</u>	<u>FY 2021</u>	<u>FY 2022</u> <u>Base</u>	<u>FY 2022</u> <u>OCO</u>	<u>FY 2022</u> <u>Total</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>FY 2026</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• SPAF 01 1206421F: <i>Counterspace Systems</i>	5.700	0.000	0.000	-	0.000	-	-	-	-	-	-

Remarks

D. Acquisition Strategy

All contracts in this program element will be awarded using competitive procedures to the maximum extent possible, to upgrade existing capabilities as well as to acquire next generation capabilities through incremental acquisitions.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 1206421F / <i>Counterspace Systems</i>	Project (Number/Name) 65A001 / <i>Counter Satellite Communications System</i>
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Product Development (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Block 10 P3I Development	Various	Various : El Segundo, CA	-	12.110	Feb 2020	-		-		-		-	-	-	-
Technical Mission Analysis	RO	Aerospace Corp : El Segundo, CA	-	0.724	Oct 2019	-		-		-		-	-	-	11.144
Enterprise Systems Engineering and Integration	C/FFP	AT&T : El Segundo, CA	-	0.199	May 2020	-		-		-		-	-	-	-
Counterspace Architecture Development	C/CPFF	NGMS : Redondo Beach, CA	-	0.000		-		-		-		-	-	-	-
Subtotal			-	13.033		-		-		-		-	-	-	N/A

Support (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Security	C/CPAF	Mantech : El Segundo, CA	-	2.157	Nov 2019	-		-		-		-	-	-	-
Miscellaneous Support Services	Various	Various : TBD	-	0.008	Nov 2019	-		-		-		-	-	-	-
Subtotal			-	2.165		-		-		-		-	-	-	N/A

Management Services (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
FFRDC	RO	Aerospace Corp : El Segundo, CA	-	0.759	Oct 2019	-		-		-		-	-	-	-
A&AS	Various	Various : El Segundo, CA	-	3.193	May 2020	-		-		-		-	-	-	-
Other Support	Various	Various : El Segundo, CA	-	0.078	Oct 2019	-		-		-		-	-	-	-

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Exhibit R-4, RDT&E Schedule Profile: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 1206421F / <i>Counterspace Systems</i>	Project (Number/Name) 65A001 / <i>Counter Satellite Communications System</i>

FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

CCS B10.3	
10.2 System Deliveries : #3-16	██████████
10.3. Development	██████████

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Exhibit R-4A, RDT&E Schedule Details: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 1206421F / <i>Counterspace Systems</i>	Project (Number/Name) 65A001 / <i>Counter Satellite Communications System</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
CCS B10.3				
10.2 System Deliveries : #3-16	1	2020	4	2020
10.3. Development	2	2020	4	2020

Note
For CCS B10.2, 14 systems delivered plus 2 trainers.

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 1206421F / <i>Counterspace Systems</i>	Project (Number/Name) 65A005 / <i>Offensive Counterspace (OCS) C2</i>
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COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
65A005: <i>Offensive Counterspace (OCS) C2</i>	-	5.127	0.000	0.000	0.000	0.000	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This effort supports the evolution of command and control (C2) and mission planning capabilities in support of the fielding and employment of Counterspace Systems. It provides for the integration and upgrade of collaborative tools to link deployable counterspace systems with Joint Warfighting C2 systems and to enable integrated planning and execution of the counterspace mission. Upgraded capabilities will be integrated into current and future command and control systems. This program will leverage the Joint Execution and Tasking System for Space (JETSS) effort in C2 for future space control and counterspace mission capabilities. Requirements for this program are derived from AFSPC prioritized requirements, in accordance with AFSPC 63-104.

B. Accomplishments/Planned Programs (\$ in Millions)

	FY 2020	FY 2021	FY 2022
Title: Joint Execution and Tasking System for Space (JETSS)	5.127	0.000	-
Description: Evolve with upgrades the counterspace mission planning and C2 capability to support counterspace systems space control warfighter activities.			
FY 2021 Plans: N/A			
FY 2021 to FY 2022 Increase/Decrease Statement: N/A			
Accomplishments/Planned Programs Subtotals	5.127	0.000	-

C. Other Program Funding Summary (\$ in Millions)

N/A

Remarks

-

D. Acquisition Strategy

All contracts will be awarded using competitive procedures to the maximum extent possible to acquire next generation capabilities through incremental acquisitions.

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Exhibit R-4, RDT&E Schedule Profile: PB 2022 Air Force			Date: May 2021
Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 1206421F / <i>Counterspace Systems</i>	Project (Number/Name) 65A005 / <i>Offensive Counterspace (OCS) C2</i>	

FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

JETSS	
C2 Spiral #6 Development	
C2 Spiral #6 Delivery	

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Exhibit R-4A, RDT&E Schedule Details: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 1206421F / <i>Counterspace Systems</i>	Project (Number/Name) 65A005 / <i>Offensive Counterspace (OCS) C2</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
JETSS				
C2 Spiral #6 Development	1	2020	1	2020
C2 Spiral #6 Delivery	1	2020	1	2020

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 5					R-1 Program Element (Number/Name) PE 1206421F / Counterspace Systems				Project (Number/Name) 65A013 / BOUNTY HUNTER			
COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
65A013: BOUNTY HUNTER	-	1.891	0.000	0.000	0.000	0.000	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Bounty Hunter (BH) supports the Defensive Space Control of US systems in a specific AOR and provides the capacity to prevent effective adversary use of Command, Control, Communications, Computers, and Intelligence (C4I). Continuing annual agile development is needed to meet new user needs in an ever changing threat environment.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver Bounty Hunter weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program element 0605831F.

B. Accomplishments/Planned Programs (\$ in Millions)

	FY 2020	FY 2021	FY 2022
Title: Bounty Hunter	1.891	0.000	0.000
Description: Develop new capabilities for the Bounty Hunter program to maintain operational capability. Specific accomplishments are classified.			
FY 2021 Plans: N/A			
FY 2022 Plans: N/A			
Accomplishments/Planned Programs Subtotals			0.000

C. Other Program Funding Summary (\$ in Millions)

Line Item	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
• SPAF 01 CTRSPC: Counterspace Systems	-	-	-	-	-	-	-	-	-		

Remarks

BH was established as a new start in FY16 as a JCTD project in response to a JUON in 2010. BH was established as a Program of Record (PoR) in March 2019.

D. Acquisition Strategy

Contracts funded for this program shall be awarded to MITRE, a Federally Funded Research and Development Center (FFRDC). The establishment of a commercial vendor has yet to be determined.

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Exhibit R-4, RDT&E Schedule Profile: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 1206421F / <i>Counterspace Systems</i>	Project (Number/Name) 65A013 / <i>BOUNTY HUNTER</i>
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	FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

<i>BOUNTY HUNTER</i>	
2019 Continuous Delivery	
Bounty Hunter Agile Development 2020	
2020 Continuous Delivery	

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Exhibit R-4A, RDT&E Schedule Details: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 1206421F / <i>Counterspace Systems</i>	Project (Number/Name) 65A013 / <i>BOUNTY HUNTER</i>
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Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>BOUNTY HUNTER</i>				
2019 Continuous Delivery	1	2020	1	2020
Bounty Hunter Agile Development 2020	1	2020	4	2020
2020 Continuous Delivery	2	2020	1	2021

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 1206422F / <i>Weather System Follow-on</i>
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COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
Total Program Element	-	2.155	0.000	0.000	0.000	0.000	-	-	-	-	-	-
65A038: <i>SSA Environmental Monitoring</i>	-	2.155	0.000	0.000	0.000	0.000	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-	-	-

A. Mission Description and Budget Item Justification

In FY 2021, PE 1206422F, Weather System Follow-on, Project 65A038, SSA Environmental Monitoring efforts were transferred to Appropriation 3620, Research, Development, Test & Evaluation, Space Force, PE 1206422SF, Weather System Follow-on, Project 65A038, SSA Environmental Monitoring from Appropriation Budget Activity 05 due to the creation of a new Appropriation for Space Force.

The Space Situational Awareness Environmental Monitoring (SSAEM) program is a non-ACAT, Class D technology demonstration project to support the international Constellation Observing System for Meteorology, Ionosphere and Climate 2 (COSMIC-2) mission. The SSAEM program provides the acquisition, development and launch/on-orbit support of 18 space/terrestrial weather sensors to COSMIC-2 partnership in coordination with National Oceanic and Atmospheric Administration (NOAA) and Taiwan's National Space Organization (NSPO). COSMIC-2 is launching six satellites in an equatorial, Low Earth Orbit (LEO) with 3 SSAEM sensors in each spacecraft by FY 2019. The sensor types are Tri-Global Navigation Satellite System (Tri-GNSS) Radio occultation System (TGRS), Ion Velocity Meter (IVM) and Radio Frequency Beacon (RFB). The SSAEM sensors will address three distinct Joint Requirement Oversight Committee (JROC)-approved Category A weather gaps, specifically Gap #4 (Ionospheric Density), Gap #7 (Equatorial Ionospheric Scintillation) and Gap #12 (Electric Field), to provide additional space meteorological data to improve forecast capabilities and improve warfighter navigation/communication capabilities.

Space acquisition must respond with speed and agility to emerging adversary threats. Space & Missile Systems Center (SMC) has transformed the organization and implementation of space acquisition to an enterprise approach, maximizing innovation and resiliency, leveraging international, commercial, and mission partnerships, and managing program/project priorities according to an integrated unclassified/classified enterprise space architecture. Expanding the appropriate acquisition authorities and contract mechanisms to deliver capability sooner, SMC will strategically execute experimentation, prototyping, risk reduction, and other efforts to develop new or repurpose capabilities.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver WSF weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program elements 1206392F and 1206398F.

This program is in Budget Activity 5, System Development and Demonstration (SDD) because it has passed Milestone B approval and is conducting engineering and manufacturing development tasks aimed at meeting validated requirements prior to full rate production.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force	Date: May 2021
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Appropriation/Budget Activity 3600: Research, Development, Test & Evaluation, Air Force I BA 5: System Development & Demonstration (SDD)	R-1 Program Element (Number/Name) PE 1206422F I Weather System Follow-on
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B. Program Change Summary (\$ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Previous President's Budget	2.237	0.000	0.000	0.000	0.000
Current President's Budget	2.155	0.000	0.000	0.000	0.000
Total Adjustments	-0.082	0.000	0.000	0.000	0.000
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	-0.082	0.000			
• Other Adjustments	0.000	0.000	0.000	0.000	0.000

Change Summary Explanation

FY 2021: -\$2.527M: funds starting in FY 2021 were transferred from RDT&E, Air Force to RDT&E, Space Force

C. Accomplishments/Planned Programs (\$ in Millions)	FY 2020	FY 2021	FY 2022
Title: Space Situational Awareness Environmental Monitoring (SSAEM)	2.155	0.000	0.000
Description: The SSAEM program is a non-ACAT, Class D technology demonstration project to support international Constellation Observing System for Meteorology, Ionosphere and Climate 2 (COSMIC-2) mission. The SSAEM program provides the acquisition, development and launch/on-orbit support of 18 space/terrestrial weather sensors to COSMIC-2 partnership in coordination with National Oceanic and Atmospheric Administration (NOAA) and Taiwan's National Space Organization (NSPO). On June 25th, 2019 COSMIC-2 successfully launched six satellites in an equatorial, Low Earth Orbit (LEO) with 3 SSAEM sensors in each spacecraft. The sensor types are; Tri-GNSS Radio occultation System (TGRS), Ion Velocity Meter (IVM) and Radio Frequency Beacon (RFB). The SSAEM sensors will address three distinct Joint Requirement Oversight Committee (JROC)-approved Category A weather gaps, specifically Gap 4 (Ionospheric Density), 7 (Equatorial Ionospheric Scintillation) and 12 (Electric Field), to provide additional space meteorological data to improve forecast capabilities and improve warfighter navigation/communication capabilities.			
FY 2021 Plans: N/A			
FY 2022 Plans: N/A			
Accomplishments/Planned Programs Subtotals	2.155	0.000	0.000

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 1206422F / <i>Weather System Follow-on</i>	
D. Other Program Funding Summary (\$ in Millions) N/A		
Remarks		
E. Acquisition Strategy SSAEM post-launch and cal/val support contract is the sole-source contract to University Corporation Atmospheric Research due to their expertise in radio occultation and space weather monitoring for SSAEM sensors. The Justification & Approval (J&A) was approved in June 2018 and the Request for Proposal was released on August 1st, 2018. The contract was awarded in July 2019 for 5-years of post-launch cal/val and on-orbit support.		
F. Performance Metrics Please refer to the Performance Base Budget Overview Book for information on how Air Force resources are applied and how those resources are contributing to Air Force performance goals and most importantly, how they contribute to our mission.		

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Exhibit R-4, RDT&E Schedule Profile: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 1206422F / <i>Weather System Follow-on</i>	Project (Number/Name) 65A038 / <i>SSA Environmental Monitoring</i>
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FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

Space Situational Awareness	
Environmental Monitoring	
SSAEM Sensors Cal/Val	

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Exhibit R-4A, RDT&E Schedule Details: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 1206422F / <i>Weather System Follow-on</i>	Project (Number/Name) 65A038 / <i>SSA Environmental Monitoring</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>Space Situational Awareness Environmental Monitoring</i>				
SSAEM Sensors Cal/Val	1	2020	4	2020

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force / BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 1206425F / <i>Space Situation Awareness Systems</i>
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COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
Total Program Element	0.000	349.612	0.000	0.000	0.000	0.000	-	-	-	-	-	-
65A006: <i>Space Based Space Surveillance</i>	0.000	349.612	0.000	0.000	0.000	0.000	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-	-	-

Program MDAP/MAIS Code: 328

A. Mission Description and Budget Item Justification

In FY2021, PE 1206425F, Space Situation Awareness Systems efforts were transferred to Appropriation 3620, Research, Development, Test & Evaluation, Space Force, PE 1206425SF Space Situation Awareness Systems from Appropriation 3600, Budget Activity 05 due to the creation of a new Appropriation for Space Force.

The Space-Based Space Surveillance (SBSS) Block 10 satellite was launched September 2010 with a design life through 2018 and an extended operational capability through 2020. The SBSS Follow-On (SBSS FO) program will develop and deliver a system to continue providing space object surveillance from space post SBSS Block 10 End-of-Life. AFSPC and NRO have signed a Memorandum of Agreement partnering SBSS FO with an NRO program based on overlapping requirements. The new partner program is called SILENTBARKER. SILENTBARKER requirements are based on a Statement of Capabilities and upon the current Space Situational Awareness (SSA) Initial Capabilities Document architectural requirements focused on protecting High Value Assets. SILENTBARKER will provide the capability to search, detect, and track objects from a space-based sensor for timely custody and event detection. Surveillance from space augments and overcomes existing ground sensor limitations with timely 24-hour above-the-weather collection of satellite metric data only possible with a space-based sensor and then communicates its findings to the Combined Space Operations Center (CSpOC), National Space Defense Center (NSDC), and other classified users. This program element includes efforts related to SILENTBARKER, its integration into the broader space superiority architecture, and analysis and experimentation to ensure space-based space surveillance capabilities against the evolving threat.

Space acquisition must respond with speed and agility to emerging adversary threats. Space & Missile Systems Center (SMC) is transforming the organization and implementation of space acquisition to an enterprise approach, maximizing innovation and resiliency, leveraging international, commercial, and mission partnerships, and managing program/project priorities according to an integrated unclassified/classified enterprise space architecture. Expanding the appropriate acquisition authorities and contract mechanisms to deliver capability sooner, SMC will strategically execute experimentation, prototyping, risk reduction, and other efforts to develop new or repurpose capabilities.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program elements 1206392F and 1206398F.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force	Date: May 2021
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Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 1206425F / <i>Space Situation Awareness Systems</i>
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This program is in Budget Activity 5, System Development and Demonstration (SDD) because it has passed Milestone B approval and is conducting engineering and manufacturing development tasks aimed at meeting validated requirements prior to full rate production.

B. Program Change Summary (\$ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Previous President's Budget	362.894	0.000	0.000	0.000	0.000
Current President's Budget	349.612	0.000	0.000	0.000	0.000
Total Adjustments	-13.282	0.000	0.000	0.000	0.000
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	-13.282	0.000			
• Other Adjustments	0.000	0.000	0.000	0.000	0.000

C. Accomplishments/Planned Programs (\$ in Millions)	FY 2020	FY 2021	FY 2022
Title: SBSS Follow-On (SBSS FO) Design & Development	349.612	0.000	0.000
Description: Performs space based SSA analysis, research, and development for the SILENTBARKER system in partnership with SILENTBARKER.			
FY 2021 Plans: N/A			
FY 2022 Plans: N/A			
Accomplishments/Planned Programs Subtotals	349.612	0.000	0.000

D. Other Program Funding Summary (\$ in Millions)
N/A

Remarks

E. Acquisition Strategy
The Acquisition Strategy was approved to minimize the space-based SSA gap post-SBSS Block 10. SILENTBARKER anticipates Initial Launch Capability in FY 2022. The SBSS FO Materiel Development Decision was approved by the Milestone Decision Authority (MDA) on April 5, 2016. The Acquisition Strategy Panel was

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity	R-1 Program Element (Number/Name)
3600: <i>Research, Development, Test & Evaluation, Air Force I BA 5: System Development & Demonstration (SDD)</i>	PE 1206425F / <i>Space Situation Awareness Systems</i>

completed with the MDA on August 29, 2016. To satisfy the SSA architecture needs, the SBSS FO program requirements combined with an NRO program and were updated in the December 2017 SILENTBARKER Statement of Capabilities. The SBSS FO program remains an Air Force program, but will leverage NRO processes to fulfill SBSS FO space segment and telemetry, tracking, and commanding (TT&C) program segments in order to further National Security Space objectives. Mutual investment for the non-recurring engineering (NRE) cost enables the potential for a larger initial constellation buy and lower unit costs. The Air Force and NRO are implementing the approach to meet mission processing requirements, develop the ground architecture, and extend capabilities in 2020 and beyond.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 1206425F / <i>Space Situation Awareness Systems</i>	Project (Number/Name) 65A006 / <i>Space Based Space Surveillance Systems</i>
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Product Development (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
SBSS Follow On Prime Development	MIPR	Various : Various	0.000	315.856	Jan 2020	-		-		-		-	-	-	-
Technical Mission Analysis	Various	Various : Various, CA	0.000	1.841	Oct 2019	-		-		-		-	-	-	-
Enterprise SE&I	Various	Various : Various	0.000	1.360	Oct 2019	-		-		-		-	-	-	-
Subtotal			0.000	319.057		-		-		-		-	-	-	N/A

Management Services (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
FFRDC	RO	Aerospace Corp. : Los Angeles, CA	0.000	1.842	Dec 2019	-		-		-		-	-	-	-
A&AS	Various	Various : CA	0.000	28.373	Jan 2020	-		-		-		-	-	-	-
Other Support	Various	Various : Various	0.000	0.340	Dec 2019	-		-		-		-	-	-	-
Subtotal			0.000	30.555		-		-		-		-	-	-	N/A

Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals			0.000	349.612	0.000	-	-	N/A

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 1206425F / <i>Space Situation Awareness Systems</i>	Project (Number/Name) 65A006 / <i>Space Based Space Surveillance</i>

	FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

SBSS Follow On	
Technology Development, Engineering and Manufacturing Development, Production	██████████
Critical Design Review (CDR)	██████████
SBSS Follow On Expanded Coverage	
Acquisition Strategy, RFP Development, Technology Evaluation	██████████

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Exhibit R-4A, RDT&E Schedule Details: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 1206425F / <i>Space Situation Awareness Systems</i>	Project (Number/Name) 65A006 / <i>Space Based Space Surveillance</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>SBSS Follow On</i>				
Technology Development, Engineering and Manufacturing Development, Production	1	2020	4	2020
Critical Design Review (CDR)	2	2020	4	2020
<i>SBSS Follow On Expanded Coverage</i>				
Acquisition Strategy, RFP Development, Technology Evaluation	1	2020	4	2020

Note
Event dates are aligned with SILENTBARKER program threshold schedule.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 1206431F / <i>Advanced EHF MILSATCOM (SPACE)</i>
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COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
Total Program Element	0.000	111.023	0.000	0.000	0.000	0.000	-	-	-	-	-	-
657104: <i>MILSATCOM Space Modernization Initiative (SMI)</i>	0.000	111.023	0.000	0.000	0.000	0.000	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-	-	-

Program MDAP/MAIS Code: 261

A. Mission Description and Budget Item Justification

In FY 2021, PE 1206431F, Advanced EHF MILSATCOM (Space) efforts were transferred to Appropriation 3620, Research, Development, Test & Evaluation, Space Force, PE 1206431SF, Advanced EHF MILSATCOM (Space) from Appropriation 3600, Budget Activity 05 due to the creation of a new Appropriation for Space Force.

The joint warfighter relies on the United States Space Force's (USSF) unprecedented ability to deliver global satellite communications (SATCOM) at all levels of warfare across the range of military operations. SATCOM provides survivable communications for Presidential support and nuclear command and control (C2) and affords national and military leaders a means to maintain strategic situational awareness and convey their intent to the Joint Force Commander. In order for the United States to maintain its asymmetric advantage of global space-based communications, the SATCOM enterprise must be prepared to "fight SATCOM" as a single enterprise through a contested, degraded and operationally-limited (CDO) environment, prevent or withstand loss, and continue to deliver effects to warfighters.

The Space Modernization Initiative (SMI) evolves current and future SATCOM systems to develop a more affordable and resilient integrated "Fighting SATCOM" enterprise capable of meeting near-term and emerging requirements. Under this construct, SMI will continue the Capabilities Insertion Program (CIP) to enhance the current Advanced Extremely High Frequency (AEHF) constellation and Protected Communications performance to improve system operational resiliency. Additionally, SMI will demonstrate technologies and concepts of operations (CONOPS) that lead to a Protected Anti-Jam Tactical SATCOM (PATs) capability that provides tactical-level military SATCOM (MILSATCOM) users protected, anti-jam SATCOM while operating in a contested environment. Finally, SMI will develop and demonstrate a roadmap to evolve the current stove-piped MILSATCOM C2 management system into a commercial and military integrated "Fighting SATCOM" Enterprise. It will do this by developing and demonstrating flexible terminal interface technologies and improving ground gateways and data networking with the space segment. The Fighting SATCOM goal is to provide warfighters a seamless end-to-end SATCOM service in a CDO environment.

Space acquisition must respond with speed and agility to emerging adversary threats. Space & Missile Systems Center (SMC) has transformed the organization and implementation of space acquisition to an enterprise approach, maximizing innovation and resiliency, leveraging international, commercial, and mission partnerships, and managing program/project priorities according to an integrated unclassified/classified enterprise space architecture. Expanding the appropriate acquisition authorities and contract mechanisms to deliver capability sooner, SMC will strategically execute experimentation, prototyping, risk reduction, and other efforts to develop new or repurpose capabilities.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver ESS weapon system capability. The use of such program

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force	Date: May 2021
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Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 1206431F / <i>Advanced EHF MILSATCOM (SPACE)</i>
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funds would be in addition to the civilian pay expenses budgeted in program elements 1206392SF and 1206398SF.

This program is in Budget Activity 5, System Development and Demonstration (SDD) because it has passed Milestone B approval and is conducting engineering and manufacturing development tasks aimed at meeting validated requirements prior to full rate production.

B. Program Change Summary (\$ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Previous President's Budget	117.290	0.000	0.000	0.000	0.000
Current President's Budget	111.023	0.000	0.000	0.000	0.000
Total Adjustments	-6.267	0.000	0.000	0.000	0.000
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	-2.575	0.000			
• SBIR/STTR Transfer	-3.692	0.000			
• Other Adjustments	0.000	0.000	0.000	0.000	0.000

C. Accomplishments/Planned Programs (\$ in Millions)	FY 2020	FY 2021	FY 2022
<p>Title: Capabilities Insertion Program (CIP)</p> <p>Description: Develop software that will increase the current AEHF constellation and Protected Communications capabilities, broaden overall user base, and accommodate a larger user population through improved resource utilization efficiencies. Develop modifications that will improve the Protected mission operational resiliency. Develop software to increase current AEHF terminal data rates with adaptive coding algorithms. Invest in technology demonstrations that improve the operational mission resiliency and effectiveness for all protected capabilities, which include, but are not limited to; Rapid Adaptive Planning and Situational Awareness for the Warfighter (RAPSAW), Mission Planning Element (MPE) 8.4, Cyber Defense-in-depth, etc.</p> <p>FY 2021 Plans: N/A</p> <p>FY 2022 Plans: N/A</p>	83.085	0.000	0.000
<p>Title: Protected Tactical Testbed</p> <p>Description: Protected Tactical Testbed provides a government gold standard of reference for risk reduction and experimentation on critical technology elements for the space payload, terminals and networking segments of the PATS system. Supports the</p>	14.299	0.000	0.000

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force		Date: May 2021		
Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 5: System Development & Demonstration (SDD)</i>		R-1 Program Element (Number/Name) PE 1206431F / <i>Advanced EHF MILSATCOM (SPACE)</i>		
C. Accomplishments/Planned Programs (\$ in Millions)		FY 2020	FY 2021	FY 2022
<p>hardware development of the hub component for the PTES ground system and any necessary test capabilities to support either the over-the-air (OTA) or laboratory demonstrations for the PTSFD. It enables system integration capabilities with industry and FFRDC partners for interoperability testing and conducting experiments to mature the PATS operations, with a focus on the Protected Tactical Waveform (PTW).</p> <p>FY 2021 Plans: N/A</p> <p>FY 2022 Plans: N/A</p>				
<p>Title: Protected Tactical Waveform (PTW) Modem Development and Demonstrations</p> <p>Description: Develop, demonstrate, test and evaluate PTW modems and components capable of being integrated into existing Army, Air Force, and Navy tactical satellite communication terminals spanning ground, aerial, and naval environments such as the Army's Satellite Transportable Terminal (STT), the Air Force's Ground Multiband Terminal (GMT), airborne terminals, and the Navy Multiband Terminal (NMT). This includes associated End Cryptographic Unit (ECU) development, testing, National Security Agency (NSA) certification, and integration with PTW modems. Conduct trade space and requirements definition with the military Services and terminal program offices to support future PTW-related capabilities. Identify potential assets such as ground hubs and information assurance components that can be further developed by future PTW-related programs. Explore opportunities and releasability of PTW-related technologies to International Partners. PTSFD is a technology demonstration that will develop and demonstrate prototype TM LRUs utilizing PTW over wideband space/ground systems. PTSFD includes an option to demonstrate over a commercial SATCOM system and design and build the MMS simulator. The PTSFD will demonstrate an Anti-Jam (AJ) and Low Probability of Intercept (LPI)/Low Probability of Detection (LPD) communications capability that can be provided to tactical users in all Services through fielded terminals, existing wideband MILSATCOM assets, and potential COMSATCOM assets.</p> <p>FY 2021 Plans: N/A</p> <p>FY 2022 Plans: N/A</p>		2.255	0.000	0.000
<p>Title: Army-Air Force Anti-Jam Modem (A3M)</p> <p>Description: The A3M will develop PTW modems that meet all environmental, integration, and mission requirements for STT and GMT tactical users. A3M development includes fabrication of pre-production modems, development of operator training materials, fielding, and sustainment planning.</p>		11.384	0.000	0.000

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force	Date: May 2021
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Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 1206431F / <i>Advanced EHF MILSATCOM (SPACE)</i>
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C. Accomplishments/Planned Programs (\$ in Millions)	FY 2020	FY 2021	FY 2022
FY 2021 Plans: N/A			
FY 2022 Plans: N/A			
Accomplishments/Planned Programs Subtotals	111.023	0.000	0.000

D. Other Program Funding Summary (\$ in Millions)

<u>Line Item</u>	<u>FY 2020</u>	<u>FY 2021</u>	<u>FY 2022</u> <u>Base</u>	<u>FY 2022</u> <u>OCO</u>	<u>FY 2022</u> <u>Total</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>FY 2026</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• SPAF 01 ADV555: <i>Advanced EHF</i>	21.894	-	-	-	-	-	-	-	-	-	-

Remarks

E. Acquisition Strategy

A3M is an ACAT III program. A3M leverages the PTSFD technology maturation resulting in a low risk development effort delivering pre-production modems with 100% production ready components. This will include certified ECUs for full scope operational and cyber testing, operator and maintainer training materials, and all required intellectual property rights, provisioning documentation, and training materials to enable swift terminal modification for operational use and sustainment. The development phase will deliver pre-production PTW capable modems ready for "build to print" production. Blended developmental and operational testing is expected to include full environmental, blue, and red team testing prior to the production decision.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 1206431F / <i>Advanced EHF MILSATC OM (SPACE)</i>	Project (Number/Name) 657104 / <i>MILSATCOM Space Modernization Initiative (SMI)</i>
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Product Development (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Product Development	C/CPAF	Not specified. : TBD	0.000	-		-		-		-		-	-	-	-
Capabilities Insertion Program (CIP)	SS/CPIF	Lockheed Martin : Sunnyvale, CA	0.000	55.835	Oct 2019	-		-		-		-	-	-	-
W/V Frequency utilization demonstration	MIPR	AFRL : Various	0.000	8.554	Nov 2019	-		-		-		-	-	-	-
Protected Tactical Service Field Demonstration (PTSFD)	Various	Various : Various	0.000	-		-		-		-		-	-	-	-
PTSFD (Modem) Contractor 1	C/CPIF	L3 : Camden, NJ	0.000	-		-		-		-		-	-	-	-
PTSFD (Modem) Contractor 2	C/CPIF	VIASAT : Carlsbad, CA	0.000	-		-		-		-		-	-	-	-
PTSFD (Modem) Contractor 3	C/CPIF	Raytheon : Marlborough, MA	0.000	-		-		-		-		-	-	-	-
PTSFD (Mission Management System simulator)	MIPR	Aerospace : El Segundo, CA	0.000	1.305	Nov 2019	-		-		-		-	-	-	-
Protected Tactical Testbed	Various	Various : Various	0.000	14.299	Dec 2019	-		-		-		-	-	-	-
A3M PTW Modem Development	C/TBD	TBD : TBD	0.000	11.384	Jan 2020	-		-		-		-	-	-	-
Technical Mission Analysis	MIPR	Aerospace : El Segundo, CA	0.000	-		-		-		-		-	-	-	-
Enterprise SE&I	C/CPAF	Linquest : Los Angeles, CA	0.000	15.000	Feb 2020	-		-		-		-	-	-	-
Subtotal			0.000	106.377		-		-		-		-	-	-	N/A

Management Services (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Management Services	C/CPAF	Not specified. : TBD	0.000	-		-		-		-		-	-	-	-

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Exhibit R-4, RDT&E Schedule Profile: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 1206431F / <i>Advanced EHF MILSATC OM (SPACE)</i>	Project (Number/Name) 657104 / <i>MILSATCOM Space Modernization Initiative (SMI)</i>

	FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
MILSATCOM Space Modernization Initiative																												
CIP: MPE 8.3 Endurance Mission Replan (EMR)																												
CIP: MPE 8.4 Design Release																												
CIP: Operational Resiliency - Phase 1																												
CIP: Operational Resiliency - Phase 2																												
W/V Frequency Utilization demonstration																												
Protected Tactical Testbed: Support End to End OTA Demonstration (TM LRU, MMS, PHEC)																												
A3M PTW Modem RFP, Source Selection/ Contract Award																												
A3M PTW Modem SFRR, PDR, CDR																												

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Exhibit R-4A, RDT&E Schedule Details: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 1206431F / <i>Advanced EHF MILSATC OM (SPACE)</i>	Project (Number/Name) 657104 / <i>MILSATCOM Space Modernization Initiative (SMI)</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>MILSATCOM Space Modernization Initiative</i>				
CIP: MPE 8.3 Endurance Mission Replan (EMR)	1	2020	3	2020
CIP: MPE 8.4 Design Release	2	2020	4	2020
CIP: Operational Resiliency - Phase 1	1	2020	4	2020
CIP: Operational Resiliency - Phase 2	2	2020	4	2020
W/V Frequency Utilization demonstration	2	2020	4	2020
Protected Tactical Testbed: Support End to End OTA Demonstration (TM LRU, MMS, PHEC)	1	2020	4	2020
A3M PTW Modem RFP, Source Selection/Contract Award	1	2020	3	2020
A3M PTW Modem SFRR, PDR, CDR	4	2020	4	2020

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 1206432F / <i>Polar MILSATCOM (SPACE)</i>
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COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
Total Program Element	0.000	385.665	0.000	0.000	0.000	0.000	-	-	-	-	-	-
654215: <i>EPS Recap</i>	0.000	385.665	0.000	0.000	0.000	0.000	-	-	-	-	-	-

Program MDAP/MAIS Code: 121

Note

In FY 2020, Project 654215, EPS Recap, efforts were transferred from PE 1206434F, Midterm Polar MILSATCOM System, Project 643720, EPS Recapitalization, in order to better align with the Enhanced Polar System (EPS) program.

A. Mission Description and Budget Item Justification

In FY 2021, PE 1206432F, Polar MILSATCOM (Space) efforts were transferred to Appropriation 3620, Research, Development, Test & Evaluation, Space Force, PE 1206432SF, Polar MILSATCOM (Space) from Appropriation 3600, Budget Activity 05 due to the creation of a new Appropriation for Space Force.

This program element acquires the Polar MILSATCOM system that provides protected communications (anti-jam and low probability of intercept and detection) for users in the North Polar Region.

In FY 2006, the DoD began funding EPS. The host spacecraft and the polar communications packages took advantage of the Advanced Extremely High Frequency (AEHF) technology including the eXtended Data Rate (XDR) waveform. The EPS Capability Development Document (CDD), approved by the Joint Requirements Oversight Council in September 2006, is based on a two-package, hosted XDR program with operational availability in CY 2015 and CY 2017. EPS is comprised of four segments: Payload, Ground Control, Gateway, and Terminal (acquired by each Service's Terminal Program Office). Milestone B review was completed April 2, 2014.

In FY 2019, the USAF and Norwegian Ministry of Defence signed the Arctic Memorandum of Agreement, which enforces the international collaboration with Norway to host two EPS-Recapitalization (EPS-R) payloads on Space Norway-procured spacecraft. Beginning FY 2020, the EPS-R effort transferred from Program Element 1206434F, Midterm Polar MILSATCOM System to Program Element 1206432F, Polar MILSATCOM (SPACE). In FY 2022, EPS-R continues to develop and acquire two Extremely High Frequency (EHF) payloads hosted on Space Norway-procured spacecraft and continues to upgrade/modify the existing EPS Ground Control and Gateway.

Space acquisition must respond with speed and agility to emerging adversary threats. Space & Missile Systems Center (SMC) has transformed the organization and implementation of space acquisition to an enterprise approach, maximizing innovation and resiliency, leveraging international, commercial, and mission partnerships, and managing program/project priorities according to an integrated unclassified/classified enterprise space architecture. Expanding the appropriate acquisition authorities and contract mechanisms to deliver capability sooner, SMC will strategically execute experimentation, prototyping, risk reduction, and other efforts to develop new or repurpose capabilities.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force	Date: May 2021
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Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 1206432F / <i>Polar MILSATCOM (SPACE)</i>
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This program element may include necessary civilian pay expenses required to manage, execute, and deliver Polar MILSATCOM weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program elements 1206392F and 1206398F.

Funding in this exhibit was previously budgeted in PE 0605432F, Polar MILSATCOM (SPACE), and PE 1206434F, Midterm Polar MILSATCOM System.

This program is in Budget Activity 5, System Development and Demonstration (SDD) because it has passed Milestone B approval and is conducting engineering and manufacturing development tasks aimed at meeting validated requirements prior to full rate production.

This program is in Budget Activity 5, System Development and Demonstration (SDD) because it has passed Milestone B approval and is conducting engineering and manufacturing development tasks aimed at meeting validated requirements prior to full rate production.

B. Program Change Summary (\$ in Millions)	<u>FY 2020</u>	<u>FY 2021</u>	<u>FY 2022 Base</u>	<u>FY 2022 OCO</u>	<u>FY 2022 Total</u>
Previous President's Budget	412.400	0.000	0.000	0.000	0.000
Current President's Budget	385.665	0.000	0.000	0.000	0.000
Total Adjustments	-26.735	0.000	0.000	0.000	0.000
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	-13.000	0.000			
• SBIR/STTR Transfer	-13.735	0.000			
• Other Adjustments	0.000	0.000	0.000	0.000	0.000

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 5					R-1 Program Element (Number/Name) PE 1206432F / Polar MILSATCOM (SPACE)				Project (Number/Name) 654215 / EPS Recap			
COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
654215: <i>EPS Recap</i>	0.000	385.665	0.000	0.000	0.000	0.000	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

In FY 2020, Project 654215, EPS Recap, efforts were transferred from PE 1206434F, Midterm Polar MILSATCOM System, Project 643720, EPS Recapitalization, in order to better align with the Enhanced Polar System (EPS) program.

A. Mission Description and Budget Item Justification

This program element acquires the Polar MILSATCOM system (EPS) and the continuation effort, EPS Recapitalization (EPS-R) providing protected communications (anti-jam and low probability of intercept and detection) for users in the North Polar Region and prevents a gap in Arctic MILSATCOM coverage in the mid to late 2020s.

In FY 2018, via PE 1206434F the DoD funded EPS-R to develop and acquire 1) two Extremely High Frequency (EHF) payloads, using Advanced EHF's (AEHF's) eXtended Data Rate (XDR) waveform, on hosted spacecraft, 2) upgrades/modifications to the existing EPS Control and Planning Segment (CAPS) to provide command and control and XDR mission planning capability, and 3) upgrades/ modifications to the existing EPS Gateway to provide connectivity between polar and midlatitude users through Department of Defense Information Networks (DODIN). EPS-R will host the payloads on a Space Norway-procured bus scheduled to launch in FY 2023. EPS-R will reuse EPS Gateway and ground control elements to the greatest extent feasible.

B. Accomplishments/Planned Programs (\$ in Millions)

	FY 2020	FY 2021	FY 2022
<p>Title: Space Segment</p> <p>Description: Develop and acquire two EHF payloads, using AEHF's XDR waveform, for integration on host spacecraft.</p> <p>FY 2021 Plans: N/A</p> <p>FY 2022 Plans: N/A</p>	332.445	0.000	0.000
<p>Title: Ground Updates</p> <p>Description: Modify and upgrade the existing EPS CAPS to provide command and control and XDR mission planning capability for the two new payloads.</p> <p>FY 2021 Plans: N/A</p> <p>FY 2022 Plans:</p>	41.920	0.000	0.000

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force	Date: May 2021
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Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 1206432F / <i>Polar MILSATCOM (SPACE)</i>	Project (Number/Name) 654215 / <i>EPS Recap</i>
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B. Accomplishments/Planned Programs (\$ in Millions)	FY 2020	FY 2021	FY 2022
N/A			
Title: Gateway Updates	11.300	0.000	0.000
Description: Modify and upgrade the existing EPS Gateway to support the two new payloads.			
FY 2021 Plans: N/A			
FY 2022 Plans: N/A			
Accomplishments/Planned Programs Subtotals	385.665	0.000	0.000

C. Other Program Funding Summary (\$ in Millions)

N/A

Remarks

D. Acquisition Strategy

Awarded payloads contract to Northrop Grumman Aerospace Systems (NGAS) and initiated fabrication of two EPS functional equivalent payloads in FY 2018 (PE 1206434F). In FY 2019, the USAF and Norwegian Ministry of Defence signed the Arctic Memorandum of Agreement, which enforces the international collaboration with Norway to host the two EPS-Recapitalization (EPS-R) payloads on the Space Norway-procured spacecraft. Conducted market research to identify industry capabilities and acquisition concepts. Awarded CAPS contract for EPS ground upgrade. Gateway updates will be accomplished by Naval Information Warfare Center Pacific, the EPS Gateway Segment developer. The program office initiates the procurement of a replacement terminal for the Telemetry and Command Terminal. This acquisition strategy updates the EPS Ground Segment to accommodate the EPS functional equivalent payloads and extend operations and sustainment beyond 2028. The U.S. Government will retain the system integrator role, as it was for EPS program of record.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 1206432F / Polar MILSATCOM (SPACE)	Project (Number/Name) 654215 / EPS Recap
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Product Development (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
EPS-R Tactical Payloads 1-2	SS/CPPIF	NGAS : Redondo Beach, CA	0.000	292.682	Nov 2019	-		-		-		-	-	-	414.329
Control and Planning Segment Upgrades	SS/CPPIF	NGMS : Redondo Beach, CA	0.000	36.906	Dec 2019	-		-		-		-	-	-	86.930
Gateway Upgrades	Various	Various : Various, CA	0.000	9.948	Jan 2020	-		-		-		-	-	-	68.895
Technical Mission Analysis	MIPR	Aerospace : El Segundo, CA	0.000	6.000	Dec 2019	-		-		-		-	-	-	-
Enterprise SE&I	C/CPAF	LinQuest : Los Angeles, CA	0.000	23.743	Jan 2020	-		-		-		-	-	-	-
Subtotal			0.000	369.279		-		-		-		-	-	-	N/A

Management Services (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
FFRDC	MIPR	Aerospace : El Segundo, CA	0.000	0.850	Jan 2020	-		-		-		-	-	-	-
A&AS	Various	Various : Various	0.000	15.386	Jan 2020	-		-		-		-	-	-	-
Other Support	Various	Various : Various	0.000	0.150	Oct 2019	-		-		-		-	-	-	-
Subtotal			0.000	16.386		-		-		-		-	-	-	N/A

Project Cost Totals	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
	0.000	385.665	0.000	-	-	-	-	-	N/A

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2022 Air Force **Date: May 2021**

Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 1206432F / <i>Polar MILSATCOM (SPACE)</i>	Project (Number/Name) 654215 / <i>EPS Recap</i>
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	FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

Space Segment	
Payload Design/Build	
International Collaboration w/ Norway	
Ground and Gateway Upgrades/ Modifications	
Risk Reduction Activities/Studies	
Ground Critical Design Review (CDR)	
Acquire Telemetry and Control Terminals	
Upgrades/Modifications	

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Exhibit R-4A, RDT&E Schedule Details: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 1206432F / <i>Polar MILSATCOM (SPACE)</i>	Project (Number/Name) 654215 / <i>EPS Recap</i>
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Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
Space Segment				
Payload Design/Build	1	2020	4	2020
International Collaboration w/ Norway	1	2020	4	2020
Ground and Gateway Upgrades/Modifications				
Risk Reduction Activities/Studies	1	2020	4	2020
Ground Critical Design Review (CDR)	3	2020	4	2020
Acquire Telemetry and Control Terminals	1	2020	4	2020
Upgrades/Modifications	1	2020	4	2020

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 1206433F / <i>Wideband Global SATCOM (SPACE)</i>
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COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
Total Program Element	-	1.855	0.000	0.000	0.000	0.000	-	-	-	-	-	-
657102: <i>Command & Control Sys-Consolidated (CCS-C)</i>	-	1.855	0.000	0.000	0.000	0.000	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-	-	-

A. Mission Description and Budget Item Justification

The Military Satellite Communications (MILSATCOM) Command and Control System-Consolidated (CCS-C) system provides integrated launch and on-orbit command and control (C2) functionality at Schriever AFB and Vandenberg AFB for MILSATCOM satellites. Schriever AFB is used for primary operations and Vandenberg AFB is used for backup operations. CCS-C uses modified commercial off the shelf hardware/software to control emerging and legacy MILSATCOM systems including Milstar, Defense Satellite Communications System (DSCS), Wideband Global SATCOM (WGS) and Advanced Extremely High Frequency (AEHF) satellites.

The CCS-C project 657102 funds system architecture evolution to provide increased performance for additional satellites and to comply with DoD, Air Force, and Air Force Space Command (AFSPC)-directed standards for Information Assurance, Satellite Control Standardization, and Net-Readiness. This continuing effort was previously funded in the FY 2014 President's Budget and prior as an Acquisition Category II (ACAT II) program. With the 10 October 2013 Final Operational Capability (FOC) declaration, the program has transitioned to an ACAT III program, the CCS-C Assurance and Capability Enhancement (CACE), beginning FY 2014. FY 2020 will be the final year for the CACE effort. The newly enhanced CCS-C system will remain and continue to be funded with O&M funds. The WGS and AEHF procurement program elements fund the mission unique software and databases for the WGS Block II Follow-On satellites and the AEHF 4-6 satellites, respectively.

Space acquisition must respond with speed and agility to emerging adversary threats. Space & Missile Systems Center (SMC) has transformed the organization and implementation of space acquisition to an enterprise approach, maximizing innovation and resiliency, leveraging international, commercial, and mission partnerships, and managing program/project priorities according to an integrated unclassified/classified enterprise space architecture. Expanding the appropriate acquisition authorities and contract mechanisms to deliver capability sooner, SMC will strategically execute experimentation, prototyping, risk reduction, and other efforts to develop new or repurpose capabilities.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver CCS-C weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program elements 1206392F and 1206398F.

This program is in Budget Activity 5, System Development and Demonstration (SDD) because it has passed Milestone B approval and is conducting engineering and manufacturing development tasks aimed at meeting validated requirements prior to full rate production.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force	Date: May 2021
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Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 1206433F / <i>Wideband Global SATCOM (SPACE)</i>
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B. Program Change Summary (\$ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Previous President's Budget	1.920	0.000	0.000	0.000	0.000
Current President's Budget	1.855	0.000	0.000	0.000	0.000
Total Adjustments	-0.065	0.000	0.000	0.000	0.000
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	-0.065	0.000			
• Other Adjustments	0.000	0.000	0.000	0.000	0.000

C. Accomplishments/Planned Programs (\$ in Millions)	FY 2020	FY 2021	FY 2022
Title: CCS-C development	1.855	0.000	0.000
Description: Develop system architecture to provide enhanced C2 of MILSATCOM satellites.			
FY 2021 Plans: N/A			
FY 2022 Plans: N/A			
Accomplishments/Planned Programs Subtotals	1.855	0.000	0.000

D. Other Program Funding Summary (\$ in Millions)
N/A

Remarks

E. Acquisition Strategy
Competitive contract was awarded in November 2012 and began performance in January 2013. The CCS-C Production and Sustainment Contract (CPASC) includes effort to increase the capability of the CCS-C system to provide ongoing C2, launch readiness support, and anomaly resolution for MILSATCOM satellite families. The CCS-C project 657102 funds system architecture evolution to provide increased performance for additional satellites and to comply with DoD, Air Force, and Space Force-directed standards for Information Assurance, Satellite Control Standardization, and Net-Readiness.

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Exhibit R-4, RDT&E Schedule Profile: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 1206433F / <i>Wideband Global SATCOM (SPACE)</i>	Project (Number/Name) 657102 / <i>Command & Control Sys-Consolidated (CCS-C)</i>
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FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

Command and Control System Consolidated (CCS-C)	
Capacity Upgrade: "Wideband Capacity Capability Improvement."	
Resource Pooling:--"Processing Architecture Capability Improvement for Better Resource Management"--"Automated Data Synchronization for Increased Efficiency."	
Cryptography Upgrade: "Replace CCS-C KI-17 with KS-252"	
Secure FTP: "Cross-Domain Capability Improvement for secure data transfer"	
IA Controls: "8500 Compliance Capability Improvement for security."	
Interoperability: "Interoperability Capability Improvement to Migrate to USB standard"	

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Exhibit R-4A, RDT&E Schedule Details: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 1206433F / <i>Wideband Global SATCOM (SPACE)</i>	Project (Number/Name) 657102 / <i>Command & Control Sys-Consolidated (CCS-C)</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
Command and Control System Consolidated (CCS-C)				
Capacity Upgrade: "Wideband Capacity Capability Improvement."	1	2020	4	2020
Resource Pooling:--"Processing Architecture Capability Improvement for Better Resource Management"--"Automated Data Synchronization for Increased Efficiency."	1	2020	4	2020
Cryptography Upgrade: "Replace CCS-C KI-17 with KS-252"	1	2020	4	2020
Secure FTP: "Cross-Domain Capability Improvement for secure data transfer"	1	2020	4	2020
IA Controls: "8500 Compliance Capability Improvement for security."	1	2020	4	2020
Interoperability: "Interoperability Capability Improvement to Migrate to USB standard"	1	2020	4	2020

Note

CCS-C upgrade started in 1Q, FY 2015.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 1206441F / <i>Space Based Infrared System (SBIRS) High EMD</i>
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COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
Total Program Element	0.000	0.001	0.000	0.000	0.000	0.000	-	-	-	-	-	-
657106: <i>EVOLVED SBIRS</i>	0.000	0.001	0.000	0.000	0.000	0.000	-	-	-	-	-	-

Program MDAP/MAIS Code: 210

Note

Project 657106: The \$1K entry in FY 2020 is a database error. This project was canceled in FY 2019.

A. Mission Description and Budget Item Justification

The SBIRS RDT&E FY 2020 budget justification exhibits describe two elements of the SBIRS program: 1) The SBIRS Engineering and Manufacturing Development (EMD) program of record PNO 210 MDAP and 2) the Space Modernization Initiative (SMI) (non-MDAP).

1. SBIRS EMD: The Space-Based Infrared System (SBIRS) primary mission is to provide initial warning of a ballistic missile attack on the US, its deployed forces, and its allies. SBIRS enhances detection and improves reporting of intercontinental ballistic missile launches, submarine launched ballistic missile launches, and tactical ballistic missile launches. SBIRS supports Missile Defense, Battlespace Awareness, and Technical Intelligence missions by providing reliable, accurate, and timely data to Unified Combatant Commanders, Joint Task Force (JTF) Commanders, the intelligence community, and other users. SBIRS provides increased detection and tracking performance over legacy systems in order to meet requirements in Air Force Space Command's (AFSPC) Operational Requirements Document (ORD). The SBIRS system includes both space and ground elements. The space segment consists of Geosynchronous Earth Orbit (GEO) satellites, payloads hosted on satellites in Highly Elliptical Orbit (HEO), and Defense Support Program (DSP) satellites. The ground segment consists of both fixed and mobile data processing elements, communications infrastructure, and relay ground stations serving all SBIRS space elements. Four HEO payloads and four GEO satellites are on-orbit. Three of the four GEO and two of the four HEO satellites have completed AFSPC and USSTRATCOM operational acceptance and are certified for Integrated Tactical Warning/ Attack Assessment (ITW/AA) missile warning operations and technical intelligence operations. HEO-3 and HEO-4 are in a storage/residual operational mode. GEO-4 (Flight 3) is proceeding through on-orbit checkout and infrared sensor tuning following its respective launch in Jan 2017. The program of record (PoR) ground segment development exploits both the new scanner and starrer sensor data through software processing and builds user messages for missile warning and missile defense. Also, data exploitation efforts enable access to raw and processed data to expand capabilities for battlespace awareness and other applications. The baseline requirement document is the 1996 SBIRS ORD. Enterprise Systems Engineering and Integration (SE&I) provides intra- and inter-program requirements development, enterprise master planning, validation and verification, specialty engineering, and architecture development.

2. SMI: The primary objective of SMI is to enable and inform future decisions to maintain and evolve a capable, resilient, and affordable OPIR architecture by maturing technologies and mitigating risk areas to facilitate OPIR modernization within the Department's constrained resources. SMI supports the PoR by assessing future parts and material obsolescence and designing future space and ground modifications focused on affordability and capability while simultaneously maximizing the effectiveness of existing system data products. SMI funds engineering activities to reduce both production and future system costs through manufacturing and producibility enhancements and through technology insertion. SMI will also mature potential technology upgrades at the component and system level for future space and ground architecture affordability and capability enhancements. The SBIRS OPIR SMI plan includes studies and risk reduction activities to evolve the current PoR

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 1206441F / <i>Space Based Infrared System (SBIRS) High EMD</i>	
<p>SBIRS constellation, reduce production timelines, and reduce recurring production costs. Based on the outcome of these studies and technology development, the Sensor Ground Demonstration will develop capability for current, next generation sensors, processors, and algorithms. SMI funded data exploitation efforts include OPIR mission data processing (MDP), data fusion, data dissemination, algorithm development, network connectivity, efficient interfaces and sensor performance assessments to enable greater exploitation of SBIRS PoR and other data sources. SMI exploitation efforts build upon PoR capabilities and inform the PoR decision process. The data exploitation efforts identify affordable, responsive and resilient measures to improve technical intelligence and battlespace awareness processing and data dissemination tools to enhance OPIR support to the warfighters and other data users. The SMI Hosted Payloads and Wide Field of View (WFOV) Testbed activities explore technology maturation, qualification of new components, and subsystem/component prototyping to evolve the OPIR architecture. Hosted Payloads and WFOV Testbeds support maturation of MDP algorithms for tactical and strategic applications which are critical demonstration efforts to enhance PoR capabilities and to reduce program risks for future OPIR systems, whether new systems or evolutions of the PoR. Collection of on-orbit WFOV data is critical to develop algorithms to process large data sets generated by emerging large format focal planes and to reduce risk for possible SBIRS follow-on architectures. SBIRS Enterprise Ground Services (EGS) infrastructure modernization efforts under SMI will introduce Telemetry, Tracking and Command systems (TT&C) and Ground Control automation, Future Operationally Resilient Ground Evolution (FORGE) MDP as well as competition into SBIRS Ground with an emphasis to on-ramp to EGS as soon as practical. SMI activities are balanced and phased to enable an expanded tradespace and improve the competitive environment.</p> <p>Space acquisition must respond with speed and agility to emerging adversary threats. Space & Missile Systems Center (SMC) is transforming the organization and implementation of space acquisition to an enterprise approach, maximizing innovation and resiliency, leveraging international, commercial, and mission partnerships, and managing program/project priorities according to an integrated unclassified/classified enterprise space architecture. Expanding the appropriate acquisition authorities and contract mechanisms to deliver capability sooner, SMC will strategically execute experimentation, prototyping, risk reduction, and other efforts to develop new or repurpose capabilities.</p> <p>This program element may include necessary civilian pay expenses required to manage, execute, and deliver SBIRS High EMD and SMI Enterprise weapon system capabilities. The use of such program funds would be in addition to the civilian pay expenses budgeted in program elements 1206392F and 1206398F.</p> <p>This program is in Budget Activity 5, System Development and Demonstration (SDD) because it has passed Milestone B approval and is conducting engineering and manufacturing development tasks aimed at meeting validated requirements prior to full rate production.</p>		

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force	Date: May 2021
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Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 1206441F / <i>Space Based Infrared System (SBIRS) High EMD</i>
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B. Program Change Summary (\$ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Previous President's Budget	0.001	0.000	0.000	0.000	0.000
Current President's Budget	0.001	0.000	0.000	0.000	0.000
Total Adjustments	0.000	0.000	0.000	0.000	0.000
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	0.000	0.000			
• Other Adjustments	0.000	0.000	0.000	0.000	0.000

Change Summary Explanation

FY 2020: Database error

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 1206441F / <i>Space Based Infrared System (SBIRS) High EMD</i>	Project (Number/Name) 657106 / <i>EVOLVED SBIRS</i>
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COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
657106: <i>EVOLVED SBIRS</i>	0.000	0.001	0.000	0.000	0.000	0.000	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-	-	-

A. Mission Description and Budget Item Justification

The SBIRS primary mission is to provide initial warning of a ballistic missile attack on the US, its deployed forces, and its allies. SBIRS enhances detection and improves reporting of intercontinental ballistic missile launches, submarine launched ballistic missile launches, and tactical ballistic missile launches. SBIRS supports Missile Defense, Battlespace Awareness, and Technical Intelligence missions by providing reliable, accurate, and timely data to Unified Combatant Commanders, Joint Task Force (JTF) Commanders, the intelligence community, and other users. SBIRS provides increased detection and tracking performance over legacy systems in order to meet requirements in Air Force Space Command's (AFSPC) Operational Requirements Document (ORD). The SBIRS system includes both space and ground elements. The space segment consists of Geosynchronous Earth Orbit (GEO) satellites, payloads hosted on satellites in Highly Elliptical Orbit (HEO), and Defense Support Program (DSP) satellites. The ground segment consists of both fixed and mobile data processing elements, communications infrastructure, and relay ground stations serving all SBIRS space elements. Four HEO payloads and four GEO satellites are on-orbit and fully mission capable, having completed AFSPC and USSTRATCOM operational acceptance and are certified for Integrated Tactical Warning/ Attack Assessment (ITW/AA) missile warning operations and technical intelligence operations. HEO-1 and HEO-2 are in a storage/residual operational mode. The program of record (PoR) ground segment development exploits both the new scanner and starrer sensor data through software processing and builds user messages for missile warning and missile defense. Also, data exploitation efforts enable access to raw and processed data to expand capabilities for battlespace awareness and other applications. The baseline requirement document is the 1996 SBIRS ORD. Enterprise Systems Engineering and Integration (SE&I) provides intra- and inter-program requirements development, enterprise master planning, validation and verification, specialty engineering, and architecture development.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver SBIRS weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program elements 1206392F and 1206398F.

This project was canceled in the FY 2019 PB.

B. Accomplishments/Planned Programs (\$ in Millions)

	FY 2020	FY 2021	FY 2022
Title: SBIRS EMD-	0.001	-	-
Description: Continued EMD contracts for Space and Ground segment development, concept studies/activities for obsolescence issues.			
Accomplishments/Planned Programs Subtotals	0.001	-	-

C. Other Program Funding Summary (\$ in Millions)

N/A

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 1206441F / Space Based Infrared System (SBIRS) High EMD	Project (Number/Name) 657106 / EVOLVED SBIRS

C. Other Program Funding Summary (\$ in Millions)

Remarks

D. Acquisition Strategy

N/A

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Exhibit R-4, RDT&E Schedule Profile: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 1206441F / <i>Space Based Infrared System (SBIRS) High EMD</i>	Project (Number/Name) 657106 / <i>EVOLVED SBIRS</i>

FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

N/A																												
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Exhibit R-4A, RDT&E Schedule Details: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 1206441F / <i>Space Based Infrared System (SBIRS) High EMD</i>	Project (Number/Name) 657106 / <i>EVOLVED SBIRS</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
N/A	1	2020	1	2020

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force / BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 1206442F / <i>Next Generation OPIR</i>
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COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
Total Program Element	-	1,470.278	0.000	0.000	0.000	0.000	-	-	-	-	-	-
657009: <i>Space Mod Initiative</i>	-	201.717	0.000	0.000	0.000	0.000	-	-	-	-	-	-
657106: <i>Next-Gen OPIR Ground</i>	-	156.232	0.000	0.000	0.000	0.000	-	-	-	-	-	-
657120: <i>Next-Gen OPIR Space, Block 0 GEO</i>	-	1,009.270	0.000	0.000	0.000	0.000	-	-	-	-	-	-
657121: <i>Next-Gen OPIR Space, Block 0 Polar</i>	-	103.059	0.000	0.000	0.000	0.000	-	-	-	-	-	-

A. Mission Description and Budget Item Justification

In FY 2021, PE 1206442F, Next Generation OPIR efforts were transferred to Appropriation 3620, Research, Development, Test & Evaluation, Space Force, PE 1206442SF, Next Generation OPIR from Appropriation 3600, Budget Activity 05 due to the creation of a new Appropriation for Space Force.

The Next-Generation Overhead Persistent Infrared (Next-Gen OPIR) RDT&E FY 2021 budget justification exhibits describe the Next-Gen OPIR Space, Ground, and Space Modernization Initiative (SMI) programs.

1. Next-Gen OPIR Space Modernization Initiative (SMI) (Project 657009): SMI supports Next-Gen OPIR by assessing and demonstrating new technologies better enabling the detection of emerging global missile threats, material obsolescence, designing space and ground modifications focused on affordability and capability, and maximizing the effectiveness of existing system data products. SMI funds engineering activities to reduce both production and future system costs through manufacturing and producibility enhancements, and technology insertion. SMI will also mature potential technology upgrades at the component and system level for space and ground architecture enhancements. SMI includes studies and risk reduction activities to evolve the current Program of Record (PoR) constellation, reduce production timelines, and reduce recurring production costs. SMI activities are balanced and phased to enable an expanded trade space and improve the competitive environment. The three major thrust areas under SMI are Demonstrations, Technology Maturation and Data Exploitation. The Demonstrations mature and demonstrate technologies with ground and on-orbit prototypes. Demonstrations advance system performance and algorithms for tactical and strategic applications to enhance PoR capabilities. Finally, demonstrations reduce program risks for future OPIR systems, whether new systems or evolutions of the current PoR. Technology Maturation assesses and addresses needs to support resiliency of PoR assets and future architectures that must respond to an evolving threat environment. Data Exploitation enables access to OPIR data sources to expand technical intelligence and battlespace awareness processing and data dissemination tools to support warfighters and other data users.

2. Next-Gen OPIR Ground (Project 657106): Next-Gen OPIR Ground, also known as Future Operationally Resilient Ground Evolution (FORGE), will consist of Command and Control (C2) migration to Air Force Space Command's (AFSPC) Enterprise Ground Services (EGS), modernization of Mission Data Processing (MDP) to implement an open framework, and required development and/or upgrades to Relay Ground Stations (RGS) to meet AFSPC guidance on the current and future space domain demands. FORGE and EGS efforts combined will provide the flexibility and scalability to integrate new satellites, sensors and capabilities more rapidly and

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 1206442F / <i>Next Generation OPIR</i>	
<p>efficiently in order to meet evolving threats and warfighter needs. The Next-Gen OPIR ground efforts enable cyber enhancements for both space and ground systems. EGS will introduce common ground services such as Telemetry, Tracking and Command (TT&C), mission management, and automation. To support initial Next-Gen OPIR Space satellite launches without driving risks into the FORGE development schedule, the program will establish a risk reduction ground Next-Gen OPIR Interim Operations (NIO) capability based on a limited SBIRS Block 20 solution that can be utilized if FORGE becomes delayed.</p> <p>3. Next-Gen OPIR Space: Is a transition from the legacy SBIRS program. Next-Gen OPIR implements the direction of the Joint Requirements Oversight Council Memorandum (JROCM) 130-17, dated 21 December 2017, by developing the next generation of strategically survivable space-based missile warning OPIR platforms in both GEO and Polar orbits. This program will deliver improved core missile warning capabilities that are more survivable against emerging threats. The full Next-Gen OPIR constellation will consist of a minimum of GEO and Polar satellites in sufficient number to meet global warning coverage with no exploitable holes (5 GEO + 2 Polar) plus required backup and attrition and reconstitution reserve. The Air Force intends to acquire Next-Gen systems in block procurements. The Block 0 acquisition strategy consists of three GEO and two Polar satellites. The first GEO satellite is required no later than FY 2025 and the first Polar satellite is required in FY2027. All five Block 0 satellites need to be on orbit by FY2029. Follow-on blocks will be addressed in future acquisition strategies. Next-Gen OPIR Space, Block 0 Geosynchronous Earth Orbit (GEO)(NGG) (Project 657120): The Program Office intends to acquire the NGG capability in two contract actions. Phase 1 was awarded in August 2018 and encompasses requirements analysis, design/development, critical path flight hardware procurement, and risk reduction efforts leading to a System CDR. Phase 2 will be awarded in FY2021 for the manufacturing, assembly, system integration and test, launch and early on-orbit test through the delivery of NGG satellites 1-3 for operational acceptance of each space vehicle.</p> <p>The Program Office is acquiring the NGP capability through three contract phases. Phase 0 awarded in June 2018, encompassed system requirements analysis and risk reduction efforts, which led to a March 2020 System Requirements Review (SRR). Phase 1 awarded May 2020, encompasses design and development, critical path flight hardware procurement, and risk reduction efforts leading to a System Critical Design Review (CDR) in FY 2025. Phase 2 will be awarded in FY 2025 for the manufacturing, assembly, integration and test, and early on orbit test, through operational acceptance of NGP satellites 1 and 2.</p> <p>Next-Gen OPIR Space, Block 1 (Project 657122): The Air Force plans to acquire subsequent blocks in a competitive environment. The Block 1 satellites will be based on the Enterprise OPIR Capability Development Document (CDD), validated by the Joint Requirements Oversight Council (JROC) in May 2019. The Next Gen OPIR Block 1 program acquisition will begin in FY 2023 in time to deliver its first satellite by FY 2030.</p> <p>Space acquisition must respond with speed and agility to emerging adversary threats. Space & Missile Systems Center (SMC) has transformed the organization and implementation of space acquisition to an enterprise approach, maximizing innovation and resiliency, leveraging international, commercial, and mission partnerships, and managing program/project priorities according to an integrated unclassified/classified enterprise space architecture. Expanding the appropriate acquisition authorities and contract mechanisms to deliver capability sooner, SMC will strategically execute experimentation, prototyping, risk reduction, and other efforts to develop new or repurpose capabilities.</p> <p>This program element may include necessary civilian pay expenses required to manage, execute, and deliver Next-Gen OPIR weapon system capabilities. The use of such program funds would be in addition to the civilian pay expenses budgeted in program elements 1206392F and 1206398F.</p>		

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 1206442F / <i>Next Generation OPIR</i>
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This program is in Budget Activity 5, System Development and Demonstration (SDD) because the majority of Projects under PE 1206442F have been declared Section 804 Rapid Prototype efforts conducting engineering and manufacturing development tasks aimed at meeting validated requirements prior to full rate production.

B. Program Change Summary (\$ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Previous President's Budget	1,470.278	0.000	0.000	0.000	0.000
Current President's Budget	1,470.278	0.000	0.000	0.000	0.000
Total Adjustments	0.000	0.000	0.000	0.000	0.000
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	0.000	0.000			
• Other Adjustments	0.000	0.000	0.000	0.000	0.000

Congressional Add Details (\$ in Millions, and Includes General Reductions)

Project: 657120: *Next-Gen OPIR Space, Block 0 GEO*

Congressional Add: *Congressional Add*

Congressional Add Subtotals for Project: 657120

Congressional Add Totals for all Projects

	FY 2020	FY 2021
	75.000	-
	75.000	-
	75.000	-

Change Summary Explanation

FY 2020: +\$75M Congressional plus-up to support Next-Gen OPIR Space, Block 0 GEO to support 2025 launch timeline of first SV.

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force										Date: May 2021		
Appropriation/Budget Activity 3600 / 5					R-1 Program Element (Number/Name) PE 1206442F / <i>Next Generation OPIR</i>				Project (Number/Name) 657009 / <i>Space Mod Initiative</i>			
COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
657009: <i>Space Mod Initiative</i>	-	201.717	0.000	0.000	0.000	0.000	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

In FY 2021, PE 1206442F, Next Generation OPIR efforts were transferred to Appropriation 3620, Research, Development, Test & Evaluation, Space Force, PE 1206442SF, Next Generation OPIR from Appropriation 3600, Budget Activity 05 due to the creation of a new Appropriation for Space Force.

Next-Generation Overhead Persistent Infrared (OPIR) Space Modernization Initiative (SMI) (Project 657009): SMI supports Next-Gen OPIR by assessing and demonstrating new technologies to better enable detection of emerging global missile threats and awareness of material obsolescence. Additionally, SMI supports space and ground design efforts focused on delivering affordable capabilities, maximizing the effectiveness of existing system data products. SMI funds engineering activities to reduce both production and future system costs through manufacturing improvements, producibility enhancements, and technology insertion. SMI will also mature potential technology upgrades at the component and system level for space and ground architecture enhancements. SMI includes studies and risk reduction activities to evolve the current SBIRS Program of Record (PoR) constellation, reduce production timelines, and reduce recurring production costs. SMI activities are balanced and phased to enable an expanded trade space and improve the competitive environment. The three major thrust areas under SMI are Demonstrations, Technology Maturation and Data Exploitation. The Demonstrations mature and demonstrate technologies with ground and on-orbit prototypes. Demonstrations advance system performance and algorithms for tactical and strategic applications to enhance PoR capabilities. Finally, demonstrations reduce program risks for future OPIR systems, whether new systems or evolutions of the current PoR. Technology Maturation assesses and addresses needs to support resiliency of PoR assets and future architectures that must respond to an evolving threat environment. Data Exploitation enables access to OPIR data sources to expand technical intelligence products, battlespace awareness processing, and data dissemination tools to support warfighters and other data users.

B. Accomplishments/Planned Programs (\$ in Millions)

	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Title: Demonstrations	111.621	0.000	0.000	0.000	0.000
Description: Demonstrations mature and demonstrate OPIR technologies with ground and on-orbit prototypes advance system performance, algorithms, and resiliency for future OPIR systems. The demonstrations explore technology maturation, qualification of new components, and subsystem/component prototyping to evolve the OPIR architecture. The demonstrations support maturation of Mission Data Processing (MDP) algorithms for tactical and strategic applications which are critical efforts to enhance PoR capabilities and to reduce program risks for future OPIR systems.					
The Wide Field Of View (WFOV) demonstration matures WFOV technology and validates multi-mission capabilities including the potential for a single sensor to simultaneously perform strategic and tactical missions. WFOV is ready for launch in FY 2021. Collection of on-orbit WFOV data is critical to develop algorithms to					

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force	Date: May 2021
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Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 1206442F / <i>Next Generation OPIR</i>	Project (Number/Name) 657009 / <i>Space Mod Initiative</i>
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B. Accomplishments/Planned Programs (\$ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
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process large data sets generated by emerging large format focal planes and reduce risk for future architectures. The WFOV payload and bus are separate development efforts. The WFOV testbed program provides a bus capable of demonstrating on-orbit mission performance and mitigating the development risks for employing WFOV sensors. The testbed program will integrate, test, and launch a prototype WFOV payload with a government-owned free-flyer spacecraft. The WFOV testbed will host the WFOV payload. As an integrated Space Vehicle, the WFOV system will prove on-orbit mission performance of WFOV sensors. The WFOV payload will provide the critical on-orbit data required to develop and validate WFOV algorithms, as well as on-board MDP throughput requirements for strategic missile warning.

The Block 1 Prototype (space vehicle) is under development and will be responsive to emerging missile types and threats to the current missile warning architecture as well as evolving threats to the enterprise. The Block 1 Prototype will inform future OPIR architecture to include those achieved by the Space Force, Missile Defense Agency (MDA), and other mission partners. The Block 1 Prototype has a Class-C mission assurance with a 3-5 year designed mission life. The Block 1 Prototype is targeting an initial launch capability beginning in 2025. The technology demonstrations will incorporate resiliency capabilities while advancing the state of the art performance technology. The demonstrations will focus on the rapid advancement, technology insertion, and launch of future generations of missile warning technologies. These assets will incorporate threat mitigation technologies and other resiliency features with the goal of demonstrating these technologies in ground and on-orbit. These demonstrations will facilitate tech insertion, validate technical performance, inform future OPIR requirements, and reduce technical risk to the enterprise.

FY 2021 Plans:

N/A

FY 2022 Base Plans:

N/A

FY 2022 OCO Plans:

N/A

Title: Technology Maturation

Description: Assess technology needs to support resiliency of PoR assets and future architectures that are responsive to the evolving threat environment. Perform trade and design studies to assess obsolescence, affordability, capability design modifications, and CONOPS for the OPIR mission. Mature technologies and manufacturability to reduce cost, schedule, and technical risk for new component and subsystem designs that

	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
	31.493	0.000	0.000	0.000	0.000

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 1206442F / <i>Next Generation OPIR</i>	Project (Number/Name) 657009 / <i>Space Mod Initiative</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
<p>may be used in the future systems. Mature technologies including algorithms, Focal Plane Arrays (FPA), optical filters, on-board processors, auxiliary resiliency payloads, and other payload components for future missile warning satellites, and reconstitution capabilities. Develop modeling and simulation (M&S) capabilities, and engineering model prototypes for hardware/software integration and testing. These efforts will reduce risk and mature technologies applicable to future systems and architectures. Additionally, develop test beds to validate/verify requirements and ensure technical maturity for next-gen payload technologies as well as threat mitigation components and techniques.</p> <p>FY 2021 Plans: N/A</p> <p>FY 2022 Base Plans: N/A</p> <p>FY 2022 OCO Plans: N/A</p>					
<p>Title: Data Exploitation</p> <p>Description: Data exploitation efforts support demonstration and prototype architecture planning and experimentation as well as provide the critical on-orbit data required to develop and validate Wide Field of View (WFOV) algorithms, as well as on-board MDP throughput requirements for strategic missile warning. Data exploitation efforts will exploit existing OPIR data sources including Defense Support Program (DSP), SBIRS Highly Elliptical Orbit (HEO), SBIRS GEO Scanner, SBIRS GEO Starer, prototypes, and other sources. Efforts will exploit data through collection, processing, fusion, data dissemination, algorithm development and testing, network connectivity, and sensor performance assessments. SBIRS and other sensors provide a rich data set for exploitation. SMI data exploitation enables access to raw and processed data for data analysts and application developers, from the government and industry, to expand capabilities for battlespace awareness and other applications. SMI data exploitation efforts are complementary to, and enhance, the exploitation capabilities delivered by the PoR. These efforts will develop tools and algorithms to enable users to apply OPIR data to support their mission needs. Data exploitation efforts also evaluate tools for C2, mission management, and MDP to reduce risk. Data exploitation efforts evolve the PoR ground system to an open architecture that could support PoR and other future satellite alternatives. SMI ground system development activities seek to demonstrate the performance of an evolved, next-generation, open-architecture ground system capable of supporting multiple satellites, payloads, and missions through management and data processing. These efforts seek to lower operating costs with enhanced net-centric and service oriented features with a new flexible expansion capability.</p>	58.603	0.000	0.000	0.000	0.000

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 1206442F / <i>Next Generation OPIR</i>	Project (Number/Name) 657009 / <i>Space Mod Initiative</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
FY 2021 Plans: N/A					
FY 2022 Base Plans: N/A					
FY 2022 OCO Plans: N/A					
Accomplishments/Planned Programs Subtotals	201.717	0.000	0.000	0.000	0.000

C. Other Program Funding Summary (\$ in Millions)											
Line Item	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
• SPAF 01 Line 13: <i>MSSBIR: SBIR High (Space)</i>	226.952	-	-	-	-	-	-	-	-	-	-
• RDTE 05 1206441F: <i>Space Based Infrared System (SBIRS) High EMD</i>	-	-	-	-	-	-	-	-	-	-	-

Remarks

D. Acquisition Strategy

The program office will use a variety of acquisition approaches to execute various concept studies, technology maturation efforts, testbed/prototype demonstrations, and data exploitation initiatives and projects. The program office will collaborate with appropriate contracting agencies to support each individual effort. Data exploitation efforts in the laboratory and the Battlespace Awareness center will leverage existing external contracts, as well as new internal competitive contracts. Activities, such as SBIRS obsolescence and affordability enhancements to the existing satellite design, will leverage existing Program of Record contracts. Technology maturation and component prototyping and/or qualification could leverage existing contracts. Broad Agency Announcements (BAAs) and Other Transaction Authorities are planned in collaboration with Air Force Research Lab (AFRL) and other government agencies. Where practical, other efforts are competed. An SMC BAA will be used to acquire and mature high priority technology items. Federally Funded Research and Development Center (FFRDC), University Affiliated Research Centers (UARCs), and Systems Engineering and Technical Assistance (SETA) contractors will also be used to conduct and support studies. New technology, replacement components, and system designs will be acquired with government data rights to the maximum extent, allowing incorporation into future OPIR satellite production or system development. Contracting partnerships with other agencies will also be used to study, develop, demonstrate, and prove emerging capabilities. Funding in execution years will be realigned within the Next-Gen OPIR program element to respond to execution requirements. To accelerate contracting actions and program execution, a local SMC contract vehicle will be utilized for the OPIR Battlespace Awareness Center (OBAC) and government lab services.

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Exhibit R-4, RDT&E Schedule Profile: PB 2022 Air Force **Date: May 2021**

Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 1206442F / <i>Next Generation OPIR</i>	Project (Number/Name) 657009 / <i>Space Mod Initiative</i>
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	FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
<i>Demonstrations - WFOV Testbed</i>																												
Payload Calibration																												
Space Vehicle Integration & Test																												
<i>Demonstrations - Block 1 Prototype</i>																												
Development																												
<i>Technology Maturation</i>																												
BAA White Papers & Proposed Review																												
BAA Awards (annual calls)																												
Architecture Studies																												
Component design & test																												
<i>Data Exploitation</i>																												
BAA Follow-on																												
Government Lab & OBAC Support Services																												

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Exhibit R-4A, RDT&E Schedule Details: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 1206442F / <i>Next Generation OPIR</i>	Project (Number/Name) 657009 / <i>Space Mod Initiative</i>
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Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>Demonstrations - WFOV Testbed</i>				
Payload Calibration	1	2020	3	2020
Space Vehicle Integration & Test	1	2020	3	2020
<i>Demonstrations - Block 1 Prototype</i>				
Development	3	2020	4	2020
<i>Technology Maturation</i>				
BAA White Papers & Proposed Review	1	2020	2	2020
BAA Awards (annual calls)	2	2020	4	2020
Architecture Studies	2	2020	3	2020
Component design & test	1	2020	4	2020
<i>Data Exploitation</i>				
BAA Follow-on	1	2020	4	2020
Government Lab & OBAC Support Services	4	2020	4	2020

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 5					R-1 Program Element (Number/Name) PE 1206442F / Next Generation OPIR				Project (Number/Name) 657106 / Next-Gen OPIR Ground			
COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
657106: Next-Gen OPIR Ground	-	156.232	0.000	0.000	0.000	0.000	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

In FY 2021, PE 1206442F, Next Generation OPIR efforts were transferred to Appropriation 3620, Research, Development, Test & Evaluation, Space Force, PE 1206442SF, Next Generation OPIR from Appropriation 3600, Budget Activity 05 due to the creation of a new Appropriation for Space Force.

Next-Gen OPIR Ground (Project 657106): Next-Gen OPIR Ground, also known as Future Operationally Resilient Ground Evolution (FORGE), will consist of Command and Control (C2) migration to US Space Force (USSF) HQ's Enterprise Ground Services (EGS), modernization of Mission Data Processing (MDP) to implement an open framework, and required development and/or upgrades to Relay Ground Stations (RGS) to meet USSF HQ guidance on the current and future space domain demands. FORGE and EGS efforts combined will provide the flexibility and scalability to integrate new satellites, sensors and capabilities more rapidly and efficiently in order to meet evolving threats and warfighter needs. The Next-Gen OPIR ground efforts enable cyber enhancements for both space and ground systems. EGS will introduce common ground services such as Telemetry, Tracking, and Command (TT&C); mission management; and automation. To support initial Next-Gen OPIR Space satellite launches without driving risks into the FORGE development schedule, the program will establish a risk reduction ground Next-Gen OPIR Interim Operations (NIO) capability based on a limited Space Based Infrared System (SBIRS) Block 20 solution.

B. Accomplishments/Planned Programs (\$ in Millions)

	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Title: Next-Gen OPIR Ground	156.232	0.000	0.000	-	0.000
Description: Infrastructure modernization and implementation of a Government owned open framework for MDP, migration for C2 of satellite operations onto EGS, and required development and/or upgrades to Relay Ground Stations (RGS).					
FY 2021 Plans: N/A					
FY 2022 Base Plans: N/A					
Accomplishments/Planned Programs Subtotals	156.232	0.000	0.000	-	0.000

C. Other Program Funding Summary (\$ in Millions)

N/A

Remarks

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 1206442F / <i>Next Generation OPIR</i>	Project (Number/Name) 657106 / <i>Next-Gen OPIR Ground</i>

D. Acquisition Strategy

The Next Gen OPIR Ground program is executing an acquisition strategy using Middle Tier of Acquisition (MTA) authority for Rapid Prototyping approved via Acquisition Decision Memorandum on 5 Dec 19.

To support this acquisition strategy, the program will follow an agile approach to develop capabilities and a robust DevSecOps (Development/Security/Operations) solution to deliver capabilities. The FORGE program is pursuing a rapid prototyping approach founded primarily on software and infrastructure reuse, partnerships with other programs, limited scope, use of existing contracts where necessary, and maximizing competition where possible. For the MDP thrust, the FORGE program will competitively use Other Transaction (OT) authorities to develop the framework and the applications. For the C2 thrust, the program team will use existing SMC contracts with an emphasis to an on-ramp to Enterprise Ground Services as soon as practical. For the NIO effort the program is using the Next Gen GEO contract with the prime contractor. For RGS thrust, the program is using traditional acquisition authorities.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 1206442F / Next Generation OPIR	Project (Number/Name) 657106 / Next-Gen OPIR Ground
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Product Development (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
FORGE - EGS/C2	Various	Various : Various	-	23.967	Apr 2020	-		-		-		-	-	-	-
FORGE - MDP	Various	Various : Various	-	45.325	Apr 2020	-		-		-		-	-	-	-
FORGE - NIO (Risk Reduction Option)	Various	Various : Various	-	42.951	Nov 2019	-		-		-		-	-	-	-
FORGE - RGS	Various	Various : Various	-	0.844	Sep 2020	-		-		-		-	-	-	-
Enterprise SE&I	C/CPAF	Engility Corp. : Andover, MA	-	5.847	Nov 2019	-		-		-		-	-	-	-
Technical Mission Analysis	RO	Aerospace Corporation : El Segundo, CA	-	8.315	Oct 2019	-		-		-		-	-	-	-
Subtotal			-	127.249		-		-		-		-	-	-	N/A

Management Services (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
FFRDC	RO	Aerospace Corporation : El Segundo, CA	-	4.319	Oct 2019	-		-		-		-	-	-	-
A&AS	Various	Various : Various	-	21.466	Feb 2020	-		-		-		-	-	-	-
Other Support	Various	Various : Various	-	3.198	Oct 2019	-		-		-		-	-	-	-
Subtotal			-	28.983		-		-		-		-	-	-	N/A

Project Cost Totals	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
	-	156.232	0.000	-	-	-	-	-	N/A

Remarks

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Exhibit R-4A, RDT&E Schedule Details: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 1206442F / <i>Next Generation OPIR</i>	Project (Number/Name) 657106 / <i>Next-Gen OPIR Ground</i>
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Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>FORGE - EGS/C2</i>				
SBIRS HEO 1 & 2 Development	1	2020	2	2020
1 SBIRS GEO on EGS	3	2020	4	2020
<i>FORGE - MDP</i>				
Competitive Prototype Framework Development	1	2020	3	2020
Competitive Prototype Applications Provider	4	2020	4	2020
Follow-on Prototype Framework Development	4	2020	4	2020
Next Gen Polar Development	4	2020	4	2020
<i>FORGE - NIO (Risk Reduction Option)</i>				
NIO Development	1	2020	4	2020
<i>FORGE - RGS</i>				
RGS Development	4	2020	4	2020

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force										Date: May 2021		
Appropriation/Budget Activity 3600 / 5					R-1 Program Element (Number/Name) PE 1206442F / Next Generation OPIR				Project (Number/Name) 657120 / Next-Gen OPIR Space, Block 0 GEO			
COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
657120: Next-Gen OPIR Space, Block 0 GEO	-	1,009.270	0.000	0.000	0.000	0.000	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

In FY 2021, PE 1206442F, Next Generation OPIR efforts were transferred to Appropriation 3620, Research, Development, Test & Evaluation, Space Force, PE 1206442SF, Next Generation OPIR from Appropriation 3600, Budget Activity 05 due to the creation of a new Appropriation for Space Force.

Next-Generation Overhead Persistent Infrared (Next-Gen OPIR) Space Block 0 Geosynchronous Earth Orbit (GEO) (Project 657120): The primary mission is to provide initial missile warning of a ballistic missile attack on the US, deployed forces and allies. The Next-Gen OPIR GEO (NGG) missile warning satellites enhance detection and improve reporting of intercontinental ballistic missile launches, submarine ballistic missile launches, and tactical ballistic missile launches. Development consists of new payloads in a highly resilient bus, providing real-time persistent global infrared coverage to meet validated Joint Requirements Oversight Council (JROC) requirements on current and future space domain demands.

The Program Office intends to acquire the NGG capability in two contract actions. Phase 1 awarded in August 2018 encompasses requirements analysis, design/development, critical path flight hardware procurement, and risk reduction efforts leading to a System Critical Design Review (CDR). Phase 2 will be awarded in FY 2021 for the manufacturing, assembly, system integration and test, launch, and early on-orbit test through operational acceptance of NGG satellites 1-3.

B. Accomplishments/Planned Programs (\$ in Millions)

	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Title: Next-Gen OPIR Space, Block 0 GEO	934.270	0.000	0.000	-	0.000
Description: Development of the Next-Gen OPIR GEO missile warning satellites with a proven bus, new hardened sensors, and auxiliary payloads for increased resilience. The space segment for GEO missile warning satellites consist of a resilient architecture providing real time persistent global equatorial infrared coverage. The first GEO satellite is required in FY 2025.					
FY 2021 Plans: N/A					
FY 2022 Base Plans: N/A					
Accomplishments/Planned Programs Subtotals	934.270	0.000	0.000	-	0.000

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 1206442F / <i>Next Generation OPIR</i>	Project (Number/Name) 657120 / <i>Next-Gen OPIR Space, Block 0 GEO</i>

	FY 2020	FY 2021
Congressional Add: Congressional Add	75.000	-
FY 2020 Accomplishments: FY 2020 Congressional Add of \$75M supports Block 0 GEO effort to deliver first Satellite Vehicle by 2025. Specific efforts are provided in Next-Gen OPIR Space, Block 0 GEO Major Thrust.		
Congressional Adds Subtotals	75.000	-

C. Other Program Funding Summary (\$ in Millions)

N/A

Remarks

D. Acquisition Strategy

The Space Force intends to acquire Next-Gen systems in block developments to deliver the required constellation. The first block, Block 0, consists of 3 Next-Gen GEO and 2 Next-Gen Polar satellites. The Next-Gen OPIR Space program has been declared a Section 804 Rapid Prototype effort under the 2016 National Defense Authorization Act (NDAA). The first GEO satellite is required by FY 2025 and the first Polar satellite is required in FY 2027. All five Block 0 satellites need to be on orbit by FY 2029. The program office awarded two sole source contracts (one to a GEO prime and one to a Polar prime) under the authority of two Justification & Authorization documents. Next-Gen GEO Phase 1 was awarded in FY 2018, encompassing requirements analysis, design/development, critical path flight hardware procurement, and risk reduction efforts leading to a System Critical Design Review for SV #1. Next-Gen GEO Phase 2 will be awarded in FY 2021 as a modification to the Phase 1 contract. This will include material buys for SV #2 and #3, as well as complete the manufacturing, assembly, system integration and test, launch, and early on-orbit test through the delivery of GEOs 1-3 for operational acceptance of each space vehicle. The Space Force plans to acquire subsequent blocks in a competitive environment. The Block 1 satellites will be based on the Missile Warning and Missile Defense OPIR Capability Development Document (CDD), validated by the Joint Requirements Oversight Council (JROC) in May 2019. Funding in execution years will be realigned within the Next-Gen OPIR program element to respond to execution requirements.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 1206442F / Next Generation OPIR	Project (Number/Name) 657120 / Next-Gen OPIR Space, Block 0 GEO
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Product Development (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total		Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete			
Next-Gen OPIR Space, Block 0 GEO	SS/CPIF	Lockheed Martin : Sunnyvale, CA	-	974.849	Oct 2019	-		-		-		-	-	-	-	-
Enterprise SE&I	C/CPAF	Engility Corp. : El Segundo, CA	-	8.471	Nov 2019	-		-		-		-	-	-	-	-
Technical Mission Analysis	RO	Aerospace Corp. : El Segundo, CA	-	10.571	Oct 2019	-		-		-		-	-	-	-	-
Subtotal			-	993.891		-		-		-		-	-	-	-	N/A

Management Services (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total		Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete			
FFRDC	RO	Aerospace Corp. : El Segundo, CA	-	7.520	Oct 2019	-		-		-		-	-	-	-	-
A&AS	Various	Various : Various	-	7.663	Feb 2020	-		-		-		-	-	-	-	-
Other Support	Various	Various : Various	-	0.196	Oct 2019	-		-		-		-	-	-	-	-
Subtotal			-	15.379		-		-		-		-	-	-	-	N/A

Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
-	1,009.270	0.000	-	-	-	-	-	N/A

Remarks

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Exhibit R-4A, RDT&E Schedule Details: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 1206442F / <i>Next Generation OPIR</i>	Project (Number/Name) 657120 / <i>Next-Gen OPIR Space, Block 0 GEO</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
Phase 1				
Bus Development	1	2020	4	2020
SV 1 Critical Path Flight Hardware	1	2020	4	2020
Payload Development	1	2020	4	2020
Payload PDR	2	2020	2	2020

Note

Next-Gen OPIR Space, Block 0 GEO efforts continue past 2020.

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force										Date: May 2021		
Appropriation/Budget Activity 3600 / 5					R-1 Program Element (Number/Name) PE 1206442F / Next Generation OPIR				Project (Number/Name) 657121 / Next-Gen OPIR Space, Block 0 Polar			
COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
657121: Next-Gen OPIR Space, Block 0 Polar	-	103.059	0.000	0.000	0.000	0.000	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

In FY 2021, PE 1206442F, Next Generation OPIR efforts were transferred to Appropriation 3620, Research, Development, Test & Evaluation, Space Force, PE 1206442SF, Next Generation OPIR from Appropriation 3600, Budget Activity 05 due to the creation of a new Appropriation for Space Force.

Next-Generation Overhead Persistent Infrared (OPIR) Space, Block 0 Polar (NGP) (Project 657121): The primary mission is to provide initial missile warning of a ballistic missile attack on the US, its deployed forces, and its allies. Next-Gen OPIR Space enhances detection and improves reporting of intercontinental ballistic missile launches, submarine launched ballistic missile launches, and tactical ballistic missile launches. Development consists of the Next-Gen OPIR Polar missile warning satellites with new payloads in a highly resilient bus, providing real-time persistent global infrared coverage to meet validated Joint Requirements Oversight Council (JROC) requirements on current and future space domain demands.

The Program Office is acquiring the NGP capability through three contract phases. Phase 0 awarded in June 2018, encompassed system requirements analysis and risk reduction efforts, which led to a March 2020 System Requirements Review (SRR). Phase 1 awarded May 2020, encompasses design and development, critical path flight hardware procurement, and risk reduction efforts leading to a System Critical Design Review (CDR) in FY 2025. Phase 2 will be awarded in FY 2025 for the manufacturing, assembly, integration and test, and early on orbit test, through operational acceptance of NGP satellites 1 and 2.

B. Accomplishments/Planned Programs (\$ in Millions)

	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Title: Next-Gen OPIR Space, Block 0 Polar	103.059	0.000	0.000	0.000	0.000
Description: Development of the Next-Gen OPIR Polar missile warning satellites using a proven bus with modifications, auxiliary payloads for improved resiliency, and new hardened sensors. The Polar space segment will consist of two Next-Gen OPIR Polar satellites in a resilient architecture, providing real time persistent infrared coverage of the northern hemisphere.					
FY 2021 Plans: N/A					
FY 2022 Base Plans: N/A					
FY 2022 OCO Plans:					

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 1206442F / <i>Next Generation OPIR</i>	Project (Number/Name) 657121 / <i>Next-Gen OPIR Space, Block 0 Polar</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
N/A					
<i>FY 2021 to FY 2022 Increase/Decrease Statement:</i> N/A					
Accomplishments/Planned Programs Subtotals	103.059	0.000	0.000	0.000	0.000

C. Other Program Funding Summary (\$ in Millions)
N/A

Remarks

D. Acquisition Strategy

The Space Force intends to acquire Next-Gen systems in block developments to deliver the required constellation. The first block, Block 0, consists of three Next-Gen Geosynchronous Earth Orbit (GEO) and two Next-Gen Polar satellites. The Next-Gen OPIR Space program has been declared a Section 804 Rapid Prototype effort under the 2016 National Defense Authorization Act (NDAA). The first GEO satellite is required by FY 2025, and the first Polar satellite is required in FY 2027. The program office awarded two sole source contracts (one to a GEO prime and one to a Polar prime) under the authority of two Justification & Authorization documents. The Next-Gen Polar Phase 0 was awarded in FY 2018, consisting of requirements development and culminated in a March 2020 SRR. Phase 1 was awarded May 2020, encompassing requirements review, design, development, critical path flight hardware procurement, and risk reduction efforts leads to a System CDR in FY 2025 for Next-Gen Polar Satellite Vehicles (SV) 1 and 2. Phase 2 will be awarded in FY 2025, encompassing build, integration, test, launch, and transition to operations for Next-Gen Polar SVs 1 and 2. The Space Force plans to acquire subsequent blocks in a competitive environment. The Block 1 satellites will be based on the Missile Warning and Missile Defense OPIR Capability Development Document (CDD), validated by the Joint Requirements Oversight Council (JROC) in May 2019.

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Exhibit R-4A, RDT&E Schedule Details: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 1206442F / <i>Next Generation OPIR</i>	Project (Number/Name) 657121 / <i>Next-Gen OPIR Space, Block 0 Polar</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
Phase 0				
Requirements Development & Analysis	1	2020	3	2020
SRR	2	2020	2	2020
Phase 1				
Phase 1 ATP	3	2020	3	2020

Note

Next-Gen OPIR Polar efforts continue past 2020

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 1206445F / <i>Commercial SATCOM (COMSATCOM) Integration</i>
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COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
Total Program Element	-	4.817	0.000	0.000	0.000	0.000	-	-	-	-	-	-
650140: <i>COMSATCOM</i>	-	4.817	0.000	0.000	0.000	0.000	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-	-	-

A. Mission Description and Budget Item Justification

In FY 2021, PE 1206445F, COMSATCOM Integration, Project 650140, COMSATCOM was transferred to PE 1206445SF, COMSATCOM Integration, Project 650140, COMSATCOM, due to Congressionally directed transfer of funding into PE1206445SF.

The Space Force has determined that an enterprise approach to the procurement, delivery, and management of its SATCOM capabilities is the best means to create an environment that is responsive to Combatant Commanders and other users across the spectrum of conflict. In addition, an enterprise approach will improve affordability and mission assurance. The COMSATCOM Program Element (PE) started this process and will continue to deliver specific COMSATCOM capabilities as well as support COMSATCOM integration into the SATCOM Enterprise. Procurement of COMSATCOM capability is also supported by the Defense Working Capital Fund (DWCF). An Overarching SATCOM Enterprise Program of Record that incorporates COMSATCOM, MILSATCOM and International Partners into a hybrid structure is found under Program Element 1206431F, Project 657104, MILSATCOM Space Modernization Initiative (SMI).

Space acquisition must respond with speed and agility to emerging adversary threats. The Space Force has transformed the organization and implementation of space acquisition to an enterprise approach, maximizing innovation and resiliency, leveraging international, commercial, and mission partnerships, and managing program/project priorities according to an integrated unclassified/classified enterprise space architecture. Expanding the appropriate acquisition authorities and contract mechanisms to deliver capability sooner, the Space Force will strategically execute experimentation, prototyping, risk reduction, and other efforts to develop new or repurpose capabilities.

This PE may include necessary civilian pay expenses required to manage, execute and deliver Commercial SATCOM in a single Enterprise architecture. The use of such funds would be in addition to the civilian pay expenses budgeted in PEs 1206392F and 1206398F.

This program is in Budget Activity 5, System Development and Demonstration (SDD) because it has passed Milestone B approval and is conducting engineering and manufacturing development tasks aimed at meeting validated requirements prior to full rate production.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 1206445F / <i>Commercial SATCOM (COMSATCOM) Integration</i>
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B. Program Change Summary (\$ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Previous President's Budget	5.000	0.000	0.000	0.000	0.000
Current President's Budget	4.817	0.000	0.000	0.000	0.000
Total Adjustments	-0.183	0.000	0.000	0.000	0.000
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	-0.183	0.000			
• Other Adjustments	0.000	0.000	0.000	0.000	0.000

Congressional Add Details (\$ in Millions, and Includes General Reductions)

Project: 650140: *COMSATCOM*

Congressional Add: *Proliferated Low Earth Orbit*

Congressional Add Subtotals for Project: 650140

Congressional Add Totals for all Projects

	FY 2020	FY 2021
	4.817	-
Congressional Add Subtotals for Project: 650140	4.817	-
Congressional Add Totals for all Projects	4.817	-

C. Accomplishments/Planned Programs (\$ in Millions)

	FY 2020	FY 2021
Congressional Add: Proliferated Low Earth Orbit	4.817	-
FY 2020 Accomplishments: This effort funded a limited proliferated Low Earth Orbit (LEO) assessment of operational merit and feasibility. The effort included assessment of COMSATCOM services; assessment of technical architecture to support the service; and assessment of impacts to existing business models, inclusive of ground control efforts necessary for the Government to manage the capability amongst an autonomous, diverse and dynamic user community.		
Congressional Adds Subtotals	4.817	-

D. Other Program Funding Summary (\$ in Millions)

N/A

Remarks

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force Date: May 2021

Appropriation/Budget Activity	R-1 Program Element (Number/Name)
3600: <i>Research, Development, Test & Evaluation, Air Force I BA 5: System Development & Demonstration (SDD)</i>	PE 1206445F / <i>Commercial SATCOM (COMSATCOM) Integration</i>

E. Acquisition Strategy

The strategy is for a focused assessment of pLEO COMSATCOM capabilities leveraging existing DARPA contracts.

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Exhibit R-4, RDT&E Schedule Profile: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 1206445F / <i>Commercial SATCOM (COM SATCOM) Integration</i>	Project (Number/Name) 650140 / <i>COMSATCOM</i>
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FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

<i>Proliferated LEO</i>	
P-LEO Assessment	[REDACTED]

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Exhibit R-4A, RDT&E Schedule Details: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 1206445F / <i>Commercial SATCOM (COM SATCOM) Integration</i>	Project (Number/Name) 650140 / <i>COMSATCOM</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>Proliferated LEO</i>				
P-LEO Assessment	2	2021	2	2022

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force / BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 1206853F / <i>National Security Space Launch Program (SPACE) - EMD</i>
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COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
Total Program Element	1,691.303	414.621	0.000	0.000	0.000	0.000	-	-	-	-	-	-
650006: <i>Next Generation Launch System Investment</i>	1,691.303	414.621	0.000	0.000	0.000	0.000	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-	-	-

Program MDAP/MAIS Code: 176

Note

- Prior year funding shown in Cost Table includes FY 2014 - FY 2017 that was executed in Program Element (PE) 0604853F.

A. Mission Description and Budget Item Justification

In FY 2021, PE 1206853F, National Security Space Launch Program efforts were transferred to Appropriation 3620, Research, Development, Test & Evaluation, Space Force, PE 1206853SF, National Security Space Launch Program from Appropriation 3600, Budget Activity 05 due to the creation of a new Appropriation for Space Force.

The National Security Space Launch (NSSL) program provides a space launch service that satisfies the government's National Launch Forecast (NLF) requirements to place National Security Space (NSS) space vehicles on orbit. NSSL is a launch service, not a weapon system, which is primarily funded with production funds.

This program, started late FY 2014, funds research and development activities and related studies, to include, but not limited to, items necessary to invest in new and/or upgraded launch systems and associated launch facilities to meet NSS launch needs leveraging domestic commercial launch providers. The RDT&E program will also fund continued research and development activities, mission manifest capability development & future studies for emerging NSS launch needs. These efforts will support future launch service development initiatives in order to continue sustained industry competition and provide emerging Space Force capabilities for a Phase 3 procurement planned for starting in FY 2025, and future procurements.

The Space Force is investing in Launch Service Agreement (LSA) public-private partnerships for the development of new and/or upgraded domestic launch systems with commercial launch service providers. The anticipated result is two domestic, commercial launch service providers that will meet all current NSS launch requirements. In addition, the Space Force is continuing a technical maturation program to address the highest risks for rocket propulsion system (RPS) and LSA development. Development of the required RPSs have continued under the LSA public-private partnerships. Future development to capitalize on new technology and innovations developed by industry may continue to utilize public-private partnerships. The Space Force will also be leveraging opportunities to integrate Department of Defense payloads on to launch services procured commercially or by other Government agencies (i.e. NASA) where excess margin is available.

Space acquisition must respond with speed and agility to emerging adversary threats. Space and Missile Systems Center (SMC) is has transformed the organization and implementation of space acquisition to an enterprise approach, maximizing innovation and resiliency, leveraging international, commercial, and mission

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force	Date: May 2021
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Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 1206853F / <i>National Security Space Launch Program (SPACE) - EMD</i>
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partnerships, and managing program/project priorities according to an integrated unclassified/classified enterprise space architecture. Expanding the appropriate acquisition authorities and contract mechanisms to deliver capability sooner, SMC will strategically execute experimentation, prototyping, risk reduction, and other efforts to develop new or re-purpose capabilities.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver NSSL system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program elements 1206392SF and 1206398SF.

This program is in Budget Activity 5, System Development and Demonstration (SDD) because it has passed Milestone B approval and is conducting engineering and manufacturing development tasks aimed at meeting validated requirements prior to full rate production.

B. Program Change Summary (\$ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Previous President's Budget	432.009	0.000	0.000	0.000	0.000
Current President's Budget	414.621	0.000	0.000	0.000	0.000
Total Adjustments	-17.388	0.000	0.000	0.000	0.000
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	-3.000	0.000			
• SBIR/STTR Transfer	-14.388	0.000			
• Other Adjustments	0.000	0.000	0.000	0.000	0.000

Change Summary Explanation

FY 2020 -3.000M decrease for higher Air Force Space priorities

C. Accomplishments/Planned Programs (\$ in Millions)	FY 2020	FY 2021	FY 2022
Title: Rocket Propulsion System Development	28.045	-	-
Description: Invest in domestic rocket propulsion systems (RPS) under the Launch Service Agreement Other Transaction Authority (OTA) agreements. This investment enables the transition from the use of non-Allied space launch engines to domestic rocket propulsion systems. Continue to execute a single RPS OTA agreement utilizing a public-private partnership.			
Title: Launch Service Agreement	386.576	-	-
Description: Invest in providers of domestic Launch Services. This investment enables the transition from the use of non-Allied space launch engines to commercial launch services that also meet NSS needs. Execute Other Transaction Authority (OTA)			

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force	Date: May 2021
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Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 1206853F / <i>National Security Space Launch Program (SPACE) - EMD</i>
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C. Accomplishments/Planned Programs (\$ in Millions)	FY 2020	FY 2021	FY 2022
agreements to develop various industry solutions utilizing public-private partnerships. Continued the technical maturation and risk reduction activities in support of Launch Service OTAs.			
Accomplishments/Planned Programs Subtotals	414.621	-	-

D. Other Program Funding Summary (\$ in Millions)											
Line Item	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
• SPAF 01 Line Item MSEELV: <i>Evolved Expendable Launch Veh (Space)</i>	1,237.635	0.000	0.000	-	0.000	-	-	-	-	-	-
• SPAF 01 Line Item <i>MSEELC: Evolved Expendable Launch Capability</i>	0.000	0.000	0.000	-	0.000	-	-	-	-	-	-

Remarks

E. Acquisition Strategy

The Department intends to pursue a strategy to competitively invest in two or more domestic launch providers' development of new launch systems or upgrades to existing systems for future NSS launch services. This shared investment approach may also leverage commitments to a portion of the planned launch services (between FY 2020 and FY 2025) to decrease the required up front Government investment.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 1206853F / <i>National Security Space Launch Program (SPACE) - EMD</i>	Project (Number/Name) 650006 / <i>Next Generation Launch System Investment</i>
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Product Development (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Aerojet Rocketdyne OTA	C/Various	Aerojet Rocketdyne : Canoga Park, CA	297.001	28.045	Oct 2019	-		-		-		-	-	-	-
United Launch Service RPS OTA	C/Various	United Launch Service : Centennial, CO	128.630	-		-		-		-		-	-	-	-
United Launch Service LSA OTA	C/Various	United Launch Service : Centennial, CO	256.605	85.768	Oct 2019	-		-		-		-	-	-	-
Orbital ATK OTA	C/Various	Orbital ATK : Magna, UT	168.714	-		-		-		-		-	-	-	-
Northrop Grumman OTA	C/Various	Northrop Grumman : Chandler, AZ	267.573	218.673	Oct 2019	-		-		-		-	-	-	-
Space X OTA	C/Various	Space X : Hawthorne, CA	97.844	-		-		-		-		-	-	-	-
Blue Origin OTA	C/Various	Blue Origin : Kent, WA	196.166	39.303	Mar 2020	-		-		-		-	-	-	-
AFRL Risk Reduction Study	C/Various	Various : various	7.074	-		-		-		-		-	-	-	-
NASA Risk Reduction Study	C/Various	Various : Various	0.000	2.000	Jul 2020	-		-		-		-	-	-	-
RAND Study	C/Various	Various : Various	1.261	-		-		-		-		-	-	-	-
Broad Agency Announcement Technical Maturation Studies	C/Various	Various : Various	37.390	-		-		-		-		-	-	-	-
NASA Advance Booster Engine Demonstration Risk Reduction (ABEDRR)	SS/ Various	Various : Various	40.374	-		-		-		-		-	-	-	-
Georgia Tech Combustion Stability Technical Maturation UARC	SS/ Various	Various : Various	7.948	-		-		-		-		-	-	-	-
NASA Combustion Stability Technical Maturation Study	SS/ Various	Various : Various	6.800	-		-		-		-		-	-	-	-

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 1206853F / <i>National Security Space Launch Program (SPACE) - EMD</i>	Project (Number/Name) 650006 / <i>Next Generation Launch System Investment</i>
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Product Development (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
AFRL Combustion Stability Technical Maturation Study	SS/ Various	Various : Various	3.179	0.300	Aug 2020	-		-		-		-	-	-	-
AFRL Hydrocarbon Boost Technical Maturation Demonstration	SS/ Various	Various : Various	37.154	-		-		-		-		-	-	-	-
FFRDC Mission Assurance	SS/CPAF	Aerospace : El Segundo, CA	46.785	3.985	Mar 2020	-		-		-		-	-	-	-
Launch Enterprise System Engineering and Integration	C/FP	Various : Various	19.959	1.846	Mar 2020	-		-		-		-	-	-	-
Launch Service Agreement (Including the Rocket Propulsion System)	C/TBD	TBD : TBD	0.000	-		-		-		-		-	-	-	-
Subtotal			1,620.457	379.920		-		-		-		-	-	-	N/A

Support (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Organic Civilian Support	Reqn	DOD : El Segundo, CA	4.864	1.960	Oct 2019	-		-		-		-	-	-	15.628
Subtotal			4.864	1.960		-		-		-		-	-	-	N/A

Management Services (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
FFRDC	SS/CPAF	Aerospace : El Segundo, CA	9.974	1.085	Mar 2020	-		-		-		-	-	-	5.263
Advisory and Assistance Services	Various	Various : Various	22.711	6.753	Dec 2019	-		-		-		-	-	-	15.258

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Exhibit R-4, RDT&E Schedule Profile: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 1206853F / <i>National Security Space Launch Program (SPACE) - EMD</i>	Project (Number/Name) 650006 / <i>Next Generation Launch System Investment</i>

	FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
<i>Rocket Propulsion System (RPS) Development</i>																												
Aerojet Rocketdyne OTA																												
<i>Launch Service Agreement (LSA)</i>																												
Blue Origin OTA																												
Northrop Grumman OTA																												
United Launch Services OTA																												

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Exhibit R-4A, RDT&E Schedule Details: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 5	R-1 Program Element (Number/Name) PE 1206853F / <i>National Security Space Launch Program (SPACE) - EMD</i>	Project (Number/Name) 650006 / <i>Next Generation Launch System Investment</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>Rocket Propulsion System (RPS) Development</i>				
Aerojet Rocketdyne OTA	1	2020	4	2020
<i>Launch Service Agreement (LSA)</i>				
Blue Origin OTA	1	2020	4	2020
Northrop Grumman OTA	1	2020	4	2020
United Launch Services OTA	1	2020	4	2020

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force **Date: May 2021**

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 6: RDT&E Management Support</i>	R-1 Program Element (Number/Name) PE 0604256F / <i>Threat Simulator Development</i>
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COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
Total Program Element	-	58.906	57.620	41.909	0.000	41.909	-	-	-	-	-	-
662907: <i>Electronic Combat Intel Support</i>	-	2.603	2.643	2.661	0.000	2.661	-	-	-	-	-	-
663321: <i>Electronic Warfare Ground Test Resources</i>	-	48.927	47.488	31.714	0.000	31.714	-	-	-	-	-	-
667500: <i>Foreign Materiel Acquisition/Analysis</i>	-	7.376	7.489	7.534	0.000	7.534	-	-	-	-	-	-

A. Mission Description and Budget Item Justification

The AF requires a comprehensive set of indoor and outdoor test facilities to implement the Air Force Electronic Warfare (EW) Test Process in order to test EW systems, including Directed Energy (DE). To manage program risk effectively throughout the EW weapons system acquisition process, and to conduct T&E effectively and efficiently, a broad multi-spectrum integrated set of T&E capabilities, ranging from Modeling and Simulation (M&S), to full-scale chamber testing, to flight testing on open-air ranges (OAR), is required. The EW Test Process Support task provides investment management and coordinated technical oversight of EW T&E facilities, including studies, analyses, and related documentation. Additionally, successful EW capabilities in battle are predicated upon a thorough understanding of the threat. To meet that requirement, this PE also includes funding to acquire foreign materiel, and to thoroughly test and evaluate that foreign materiel to understand how those threat systems affect and are affected by our EW systems.

This program is in Budget Activity 6, RDT&E Management Support because this budget activity includes research, development, test and evaluation efforts and funds to sustain and/or modernize the installations or operations required for general research, development, test and evaluation.

B. Program Change Summary (\$ in Millions)

	<u>FY 2020</u>	<u>FY 2021</u>	<u>FY 2022 Base</u>	<u>FY 2022 OCO</u>	<u>FY 2022 Total</u>
Previous President's Budget	59.693	57.725	44.777	0.000	44.777
Current President's Budget	58.906	57.620	41.909	0.000	41.909
Total Adjustments	-0.787	-0.105	-2.868	0.000	-2.868
• Congressional General Reductions	0.000	-0.105			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	-0.787	0.000			
• Other Adjustments	0.000	0.000	-2.868	0.000	-2.868

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 6: RDT&E Management Support</i>	R-1 Program Element (Number/Name) PE 0604256F / <i>Threat Simulator Development</i>
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Change Summary Explanation

FY22 decrease due to \$2.3 million reduction for higher AF priorities and a \$0.6 million reduction due to adjustment for non-pay/fuel inflation rates.

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force										Date: May 2021		
Appropriation/Budget Activity 3600 / 6					R-1 Program Element (Number/Name) PE 0604256F / Threat Simulator Development				Project (Number/Name) 662907 / Electronic Combat Intel Support			
COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
662907: <i>Electronic Combat Intel Support</i>	-	2.603	2.643	2.661	0.000	2.661	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This project provides funding to support Foreign Materiel Operational Test and Evaluation (FMOT&E), which ensures the ability of operational commands to test and develop effective Electronic Attack/Electronic Protection (EA/EP) techniques and tactics. Funds are required for: deployment of systems to test facilities; travel of personnel to the test sites to evaluate and validate test results; range and laboratory costs; test consumables; costs for instrumentation of systems; and contracted engineering support for the conduct of tests and subsequent reporting. Funding for this program is required to prevent future aircraft losses due to improper and inaccurate aircrew tactics (e.g., lack of evasive action or proper tactics training to avoid missile attack).

B. Accomplishments/Planned Programs (\$ in Millions)

	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Title: FMOT&E	2.603	2.643	2.661	0.000	2.661
Description: Supports Foreign Materiel Operational Test and Evaluation (FMOT&E)					
FY 2021 Plans: Continue operations of electronic combat intelligence support for fighter and bomber testing, mobility special operations transport and helicopter testing, classified operational assessments and extensive evaluations and reporting of system effectiveness.					
FY 2022 Base Plans: Continue operations of electronic combat intelligence support for fighter and bomber testing, mobility special operations transport and helicopter testing, classified operational assessments and extensive evaluations and reporting of system effectiveness.					
FY 2022 OCO Plans: N/A					
FY 2021 to FY 2022 Increase/Decrease Statement: N/A					
Accomplishments/Planned Programs Subtotals	2.603	2.643	2.661	0.000	2.661

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 6	R-1 Program Element (Number/Name) PE 0604256F / <i>Threat Simulator Development</i>	Project (Number/Name) 662907 / <i>Electronic Combat Intel Support</i>

C. Other Program Funding Summary (\$ in Millions)

<u>Line Item</u>	<u>FY 2020</u>	<u>FY 2021</u>	<u>FY 2022</u> <u>Base</u>	<u>FY 2022</u> <u>OCO</u>	<u>FY 2022</u> <u>Total</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>FY 2026</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• RDTE 06 PE 0605807F: <i>Test and Evaluation Support</i>	795.626	761.307	811.032	-	811.032	-	-	-	-	-	-
• RDTE 06 PE 0605976F: <i>Facility Restoration and Modernization - T&E</i>	88.445	70.856	70.788	-	70.788	-	-	-	-	-	-
• RDTE 06 PE 0605978F: <i>Facility Sustainment - T&E Support</i>	29.424	29.826	30.057	-	30.057	-	-	-	-	-	-

Remarks

D. Acquisition Strategy

N/A

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force										Date: May 2021		
Appropriation/Budget Activity 3600 / 6					R-1 Program Element (Number/Name) PE 0604256F / Threat Simulator Development				Project (Number/Name) 663321 / Electronic Warfare Ground Test Resources			
COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
663321: <i>Electronic Warfare Ground Test Resources</i>	-	48.927	47.488	31.714	0.000	31.714	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The AF requires a comprehensive set of test facility modernizations to improve Electronic Warfare (EW) which includes Directed Energy (DE) weapons Test and Evaluation (T&E) capabilities. This funding is used to improve and modernize threat system simulators, stimulators, emitters and supporting infrastructure to sufficiently and cost effectively test and evaluate current and future weapon systems' ability to perform in realistic EW threat representative environments. The National Radar Cross Section (RCS) Test Facility (NRTF) at Holloman AFB, NM, provides timely, accurate, and secure RCS and antenna measurements for tri-service and joint program offices, DoD laboratories, Defense Advanced Research Projects Agency (DARPA) and industry. The NRTF tests fielded and developmental systems and technologies to meet Low Observable (LO) and EW customer requirements. The Guided Weapons Evaluation Facility (GWEF) at Eglin AFB, FL, and the Digital Integrated Air Defense System (DIADS) at Edwards AFB, CA, provide the ability to realistically evaluate hardware and software components of US weapon systems against manned hardware threat representations throughout the acquisition process. The GWEF provides simulations of advanced Infrared (IR) Surface-to-Air Missiles (SAMs) and Air-to-Air Missiles (AAMs), IR and Laser countermeasure functions, and the integration of actual threat hardware and ground clutter into advanced threat IR missile simulations. DIADS provides mission level simulations of both algorithm-based and man-in-the-loop-based enemy command and control (C2) capabilities that integrate early warning radar detection, SAM engagement capabilities, and limited ground-controlled fighter intercepts. The Benefield Anechoic Facility (BAF) at Edwards AFB, CA, and the Joint Preflight Integration of Munitions and Electronic Systems (J-PRIMES) facility at Eglin AFB, FL, both provide threat-representative EW emitters and stimulators to replicate a variety of land, sea and airborne threats in a controlled RF environment to evaluate full-scale weapon systems. The BAF additionally provides an ability to perform Electromagnetic Interference/Compatibility (EMI/EMC) testing to ensure radars, jammers, radios, and other flight-critical electronic systems will not interfere with each other during a mission. The Central Inertial and GPS Test Facility (CIGTF) at the 704th Test Group at Holloman AFB, NM provides threat-representative GPS jammers and laydowns in both lab and open-air environments to test avionics systems' performance when under various GPS-denial conditions. Provides EW test process support, conducting requirements analyses and other studies in support of AF T&E investments in test infrastructure and capabilities.

In previous R-2 Exhibits, EW T&E modernization efforts within this PE's BPAC were identified via two mission area categories: Improvement and Modernization (I&M) and EC Test Process Support. To more accurately align this R-2 Exhibit with the funding/execution baseline for this BPAC, the two aforementioned mission area categories have been combined into a single mission area titled, "Electronic Warfare Ground Test Resources".

B. Accomplishments/Planned Programs (\$ in Millions)

	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Title: Electronic Warfare Ground Test Resources	48.927	47.488	31.714	0.000	31.714
Description: Provides for planning, monitoring, improvement and modernization of test capabilities to conduct and support the AF EW test process. Provides for EW test process support. Conducts requirements analyses					

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 6	R-1 Program Element (Number/Name) PE 0604256F / <i>Threat Simulator Development</i>	Project (Number/Name) 663321 / <i>Electronic Warfare Ground Test Resources</i>

B. Accomplishments/Planned Programs (\$ in Millions)

and other studies in support of Air Force T&E investments in test infrastructure and capabilities. Plans for FY2020 and FY2021 include, but are not limited to, the following EW efforts which may be accelerated or delayed due to variations in customer requirements and overall project execution.

FY 2021 Plans:

Continue executing development, procurement and integration of EW programs such as Red Integrated Air Defense System (Red-IADS), Electronics Warfare Test Capability Improvement Program (EWTCIP), Jammer Electronic Counter Measures (JECM) Enhancement and Integration, National RCS Test Facility (NRTF) Modernization and Measurement, and Infra-Red Countermeasure-Capability Modernization (IRCM-CM). NEWEG for J-PRIMES (NEWEG-J Phase I), CIGTF GPS NAVWAR Upgrade (CGNU), and NRTF-Capability Modernization (CM) Programs are nearing the end of their development. This is also the final year for implementing 5GATE technologies. Also included is continued funding of SETA support necessary to implement planned Air Force test processes and infrastructure for I&M capabilities, support tri-service monitoring and analysis teams established to identify emerging joint investment needs and requirements development, and assist in the management and monitoring of I&M program elements and activities.

FY 2022 Base Plans:

Continue executing development, procurement and integration of EW programs such as Red Integrated Air Defense System (Red-IADS), Electronics Warfare Test Capability Improvement Program (EWTCIP), Jammer Electronic Counter Measures (JECM) Enhancement and Integration, National RCS Test Facility (NRTF) Modernization and Measurement, and Infra-Red Countermeasure-Capability Modernization (IRCM-CM). NEWEG for J-PRIMES (NEWEG-J Phase I), CIGTF GPS NAVWAR Upgrade (CGNU), and NRTF-Capability Modernization (CM) Programs are nearing the end of their development. Also included is continued funding of SETA support necessary to implement planned Air Force test processes and infrastructure for I&M capabilities, support tri-service monitoring and analysis teams established to identify emerging joint investment needs and requirements development, and assist in the management and monitoring of I&M program elements and activities.

FY 2022 OCO Plans:

N/A

FY 2021 to FY 2022 Increase/Decrease Statement:

FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 6	R-1 Program Element (Number/Name) PE 0604256F / <i>Threat Simulator Development</i>	Project (Number/Name) 663321 / <i>Electronic Warfare Ground Test Resources</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
FY22 funding decrease is the result of a \$13 million decrease due to the termination of 5GATE Tech Upgrade and a \$2.7 million decrease due to a reprogramming for higher AF priorities and a non-pay/fuel adjustment.					
Accomplishments/Planned Programs Subtotals	48.927	47.488	31.714	0.000	31.714

C. Other Program Funding Summary (\$ in Millions)											
Line Item	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
• RDTE 06 0605807F: <i>Test and Evaluation Support</i>	795.626	761.307	811.032	-	811.032	-	-	-	-	-	-
• RDTE 06 0605976F: <i>Facilities Restoration and Modernization - Test and Evaluation Support</i>	88.445	70.856	70.788	-	70.788	-	-	-	-	-	-
• RDTE 06 0605978F: <i>Facilities Sustainment - Test and Evaluation Support</i>	29.424	29.826	30.057	-	30.057	-	-	-	-	-	-

Remarks

D. Acquisition Strategy

N/A

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 6					R-1 Program Element (Number/Name) PE 0604256F / Threat Simulator Development				Project (Number/Name) 667500 / Foreign Materiel Acquisition/Analysis			
COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
667500: Foreign Materiel Acquisition/Analysis	-	7.376	7.489	7.534	0.000	7.534	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This project's specific purpose is to support USAF Foreign Materiel Program requirements through the acquisition and analysis of foreign materiel. Items considered for these Foreign Materiel Acquisition (FMA) funds are included in the prioritized Air Force FMA Top 20 list established each year. Each Major Command (MAJCOM) prepares and approves a Foreign Materiel - Mission Requirements Statement for each requirement. Annually, the MAJCOM commanders establish a list of their top 20 requirements. The MAJCOMs' requirements lists are integrated and prioritized into a classified Air Force requirement list. Each MAJCOM then approves the FMA Top 20 List and final validation comes from the Air Force Vice Chief of Staff. System analyses are based on and driven by acquisitions. The USAF provides assessments and data for threat systems to all DoD components.

B. Accomplishments/Planned Programs (\$ in Millions)

	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Title: FMP	7.376	7.489	7.534	-	7.534
Description: Supports USAF Foreign Materiel Program (FMP) Requirements through the acquisition and analysis of foreign materiel.					
FY 2021 Plans: Continue to fund acquisition of available Foreign Materiel in accordance with the prioritized Air Force Foreign Materiel List; analysis of acquired Foreign Materiel; and operations and maintenance of the specialized Foreign Materiel assets.					
FY 2022 Base Plans: Continue to fund acquisition of available Foreign Materiel in accordance with the prioritized Air Force Foreign Materiel List; analysis of acquired Foreign Materiel; and operations and maintenance of the specialized Foreign Materiel assets.					
FY 2021 to FY 2022 Increase/Decrease Statement: N/A					
Accomplishments/Planned Programs Subtotals	7.376	7.489	7.534	-	7.534

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 6	R-1 Program Element (Number/Name) PE 0604256F / <i>Threat Simulator Development</i>	Project (Number/Name) 667500 / <i>Foreign Materiel Acquisition/ Analysis</i>

C. Other Program Funding Summary (\$ in Millions)

<u>Line Item</u>	<u>FY 2020</u>	<u>FY 2021</u>	<u>FY 2022</u> <u>Base</u>	<u>FY 2022</u> <u>OCO</u>	<u>FY 2022</u> <u>Total</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>FY 2026</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• RDTE 06 PE 0605807F: <i>Test and Evaluation Support</i>	795.626	761.307	811.032	-	811.032	-	-	-	-	-	-
• RDTE 06 PE 0605976F: <i>Facility Restoration & Modernization - T&E</i>	88.445	70.856	70.788	-	70.788	-	-	-	-	-	-
• RDTE 06 PE 0605978F: <i>Facilities Sustainment -T&E Support</i>	29.424	29.826	30.057	-	30.057	-	-	-	-	-	-

Remarks

D. Acquisition Strategy

N/A

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force</i> / BA 6: <i>RDT&E Management Support</i>	R-1 Program Element (Number/Name) PE 0604759F / <i>Major T&E Investment</i>
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COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
Total Program Element	-	106.014	208.299	130.766	0.000	130.766	-	-	-	-	-	-
664597: <i>AF Test Investments</i>	-	106.014	208.299	130.766	0.000	130.766	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-	-	-

A. Mission Description and Budget Item Justification

This PE provides planning, improvements, and modernization for test capabilities within Air Force Test Center (AFTC) Major Range and Test Facility Base organizations: 96 Test Wing at Eglin AFB FL, the 412 Test Wing at Edwards AFB CA, and Arnold Engineering Development Complex (AEDC) at Arnold AFB TN. The 704th Test Group at Holloman AFB NM and the McKinley Climatic Lab at Eglin AFB are aligned under AEDC as part of the management consolidation of Ground test capabilities. Finally, in FY20 and FY21 this PE provides funds to Air Force Space Command (AFSPC) now United States Space Force (USSF) for space threat testing. In FY22, Space threat funding was transferred to USSF.

The improvement and modernization (I&M) requirements are defined through the AF Test Investment Planning & Programming (TIPP) Process. All projects have been reviewed through the Tri-Service Reliance Process (to communicate AF efforts to the other services and avoid unwarranted duplication of effort) and are documented in the Technology Development Acquisition Program (TDAP) database. Each project has its own planning, development, equipment acquisition, equipment installation, and checkout phases which often require significant differences in funding from one year to the next. As such, the changes in category funding from year to year does not necessarily indicate program growth, but rather a planned phasing of I&M efforts. The test capabilities at these locations enable testing through all phases of weapon system acquisition, from system concept exploration through component and full-scale integrated weapon system test to operational test.

The 96 TW, at Eglin AFB FL, conducts and supports Developmental Test and Evaluation (DT&E) of non-nuclear air armaments; Command, Control, Communications, Computers, Intelligence, Surveillance, Reconnaissance (C4ISR) systems; target acquisition and weapon delivery systems; determines target/test item spectral signatures; and provides cyber testing capabilities as part of the Avionics Cyber Range (ACR).

The 412th Test Wing, at Edwards AFB CA, conducts and supports DT&E and Operational Test and Evaluation (OT&E) of aircraft and aircraft systems, aerospace research vehicles, unmanned aerial vehicles, cruise missiles, parachute delivery/recovery/systems, and cargo handling systems.

AEDC, at Arnold AFB TN, provides pre-flight reliability environmental test support for DoD aeropropulsion, flight systems, and space and missile programs. The center has 53 test facilities providing: aerodynamic testing of scale model aircraft, missiles, and space systems; testing of large and full-scale satellites, sensors, and space vehicles in a simulated space environment; altitude environmental testing for aircraft, missile, and spacecraft propulsion systems; testing of large-scale models such as space boosters together with their propulsion systems. This capability includes the world's largest climatic laboratory, the McKinley Climatic Laboratory at Eglin AFB, which provides controlled all-weather condition testing of full scale systems. The 704th TG at Holloman AFB, NM provides flight test and test support for joint, international and commercial customers in advanced avionics and weapons, inertial navigation systems, Global Positioning System (GPS) and other integrated aircraft and missile navigation systems. They test subsonic through hypersonic ground performance of aircraft and missiles in a flight-representative, highly instrumented

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 6: RDT&E Management Support</i>	R-1 Program Element (Number/Name) PE 0604759F / <i>Major T&E Investment</i>	
<p>environment while also coordinating and scheduling all US Air Force test operations at White Sands Missile Range. The 704th TG OL-AC at Wright-Patterson AFB, OH provides independent developmental T&E in support of aircraft survivability and evaluation of full-scale aircraft landing gear, tires and brakes. They also provide an independent capability for component qualification.</p> <p>In order to align the strategic capability goals set forth in the 2018 National Defense Strategy and the mission of the AFTC, program element funding has been assigned to these six mission area categories: T&E Range Asset Modernization, Hypersonics, Directed Energy, Cyberspace and Avionics Cyber, Autonomy, and Space Test Infrastructure.</p> <p>1) T&E Range and Test Asset Modernization refers to those capabilities required to acquire the ability to test long range, high-speed, highly-instrumented, high-data rate weapons in a crowded and restricted spectrum, while operating at multiple classification and cybersecurity levels. Also included in this mission area is the ability to collect, analyze and store big data and the ability to do multi-domain testing across the enterprise with realistic threat scenarios at multiple classification level up to Special Access Program (SAP).</p> <p>2) Hypersonics refers to the ability to test and evaluate flight-representative hypersonic engines, materials, warheads and fuzes in all portions of the employment envelope and conduct flight testing both in simulation and open-air ranges with sufficient space, telemetry, photo-optics and Time Space Position Information (TSPI) to appropriately inform decision-makers fielding such systems.</p> <p>3) Directed Energy/Electronic Combat acquires the ability to characterize irradiance and beam properties on aircraft, small UAVs and ground targets and create realistic environments to simulate adversary air defense capabilities in the year 2030. Enables 5th-6th generation weapon testing/tactics development in a threat-realistic Anti-Access Area Denial (A2AD) environment using a combination of indoor and open-air ranges.</p> <p>4) Cyberspace and Avionics Cyber is the advancement of cybersecurity/resiliency test capability for network, C4ISR, and airborne weapon platforms and includes development of tools, techniques and hardware-in-the-loop capabilities focused on cybersecurity and cyber-resiliency.</p> <p>5) Autonomy refers to the ability to test autonomous aerial and ground systems with hundreds of independent vehicles. Must be able to monitor system-under-test locations and states with the ability for soft and hard termination. Must develop techniques and processes to test systems with artificial intelligence.</p> <p>6) Space Test Infrastructure refers to the development of a Space Combined Test Force and the development of technical capabilities, both terrestrial and space-based assets, in order to deploy an initial level of ability to test and evaluate the capability and resilience of DoD Space systems in a contested environment.</p> <p>This program is in Budget Activity 6, RDT&E Management Support because this budget activity includes research, development, test and evaluation efforts and funds to sustain and/or modernize the installations or operations required for general research, development, test and evaluation.</p>		

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force	Date: May 2021
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Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force</i> / BA 6: <i>RDT&E Management Support</i>	R-1 Program Element (Number/Name) PE 0604759F / <i>Major T&E Investment</i>
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B. Program Change Summary (\$ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Previous President's Budget	106.663	208.680	207.845	0.000	207.845
Current President's Budget	106.014	208.299	130.766	0.000	130.766
Total Adjustments	-0.649	-0.381	-77.079	0.000	-77.079
• Congressional General Reductions	0.000	-0.381			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	-0.649	0.000			
• Other Adjustments	0.000	0.000	-77.079	0.000	-77.079

Change Summary Explanation

FY22 decrease due to transfer of \$71 million for space threat test infrastructure to United States Space Force (USSF) new program element, 1206759SF, Major T&E Investment Space, \$4.2 million decrease for higher DoD priorities, and a \$1.9 million reduction due to adjustment for non-pay/fuel inflation rates.

C. Accomplishments/Planned Programs (\$ in Millions)	FY 2020	FY 2021	FY 2022
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Title: T&E Range and Test Asset Modernization	35.346	63.425	53.273
Description: Description: T&E Range and Test Asset Modernization refers to those capabilities required to acquire the ability to test long range, high-speed, highly-instrumented, high-data rate weapons in a crowded and restricted spectrum, while operating at multiple classification and cybersecurity levels. Ability to collect, analyze and store big data and ability to do multi-domain testing across the enterprise with realistic threat scenarios at multiple classification level up to Special Access Program (SAP).			
FY 2021 Plans: Continue planning and/or executing of the following programs: Common Range Integrated Instrumentation System (CRIIS) Production, Network Telemetry Integration Program (NTIP) (formerly iSIS), Common Airborne Network Instrumentation System (CANIS), Modular Mission Control Room Upgrade (MMCRU), Voice Communication System Upgrade (VCSU), Improved C2 Test Operations Center (I - C2TOC), Airborne Sensor Data Correlation Project (ASDC), Improved Data Link Hardware-in-the-Loop (HITL) - Gen 4 & 5, Multi-Level Security - Joint Collaborative Environment (MLS - JCE), Next Generation Turbine Engine Test Capability (NGTETC), Improve Plant Reliability and Efficiency/Transonic Aero Test Capability (IMTPC), Improve Large Model Supersonic Aerodynamic Ground T&E Capability (ILMSC) [formerly Tunnel 16S Reactivation], Advanced Engine Requirements for Power and Thermal Loads, High-speed Small Engine Test Capability (HSETC) (previously ASMEC-II), High Pressure Air Additional Capacity (HPAAC), and the Gulf Range Enhancement (GRE) project.			
FY 2022 Plans:			

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force		Date: May 2021		
Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 6: RDT&E Management Support</i>		R-1 Program Element (Number/Name) PE 0604759F / <i>Major T&E Investment</i>		
C. Accomplishments/Planned Programs (\$ in Millions)		FY 2020	FY 2021	FY 2022
<p>Continue planning and/or executing of the following programs: CRIIS Production, Network Telemetry Integration Program (NTIP) (formerly iSIS), Common Airborne Network Instrumentation System (CANIS), Modular Mission Control Room Upgrade (MMCRU), Voice Communication System Upgrade (VCSU), Improved C2 Test Operations Center (I - C2TOC), Airborne Sensor Data Correlation Project (ASDC), Improved Data Link HITLS - Gen 4 & 5, Multi-Level Security - Joint Collaborative Environment (MLS - JCE), Improve Plant Reliability and Efficiency/Transonic Aero Test Capability (IMTPC), Improve Large Model Supersonic Aerodynamic Ground T&E Capability (ILMSC) [formerly Tunnel 16S Reactivation], Advanced Engine Requirements for Power and Thermal Loads, High-speed Small Engine Test Capability (HSETC) (previously ASMEC-II), and the Gulf Range Enhancement (GRE) project.</p> <p>FY 2021 to FY 2022 Increase/Decrease Statement: FY22 funding decrease of \$5.5 million due to completion of the NGTETC and HPAAC programs in FY21, \$2.7 million reduction for higher AF and DoD priorities, and a \$1.9 million reduction due to adjustment for non-pay/fuel inflation rates.</p>				
<p>Title: Hypersonics</p> <p>Description: Hypersonics refers to the ability to T&E flight-representative hypersonic engines, materials, warheads and fuzes in all portions of the employment envelope and conduct flight testing both in simulation and open-air ranges with sufficient space, telemetry, photo-optics and Time Space Position Information (TSPI) to appropriately inform decision-makers fielding such systems.</p> <p>The Department of Defense Test Resource Management Center (TRMC) oversees and manages all hypersonic test investment.</p> <p>FY 2021 Plans: Continue planning and/or executing of the Imaging Improvement and Modernization Program (I2MP).</p> <p>FY 2022 Plans: Continue planning and/or executing of the Imaging Improvement and Modernization Program (I2MP).</p> <p>FY 2021 to FY 2022 Increase/Decrease Statement: N/A</p>		1.000	1.338	1.338
<p>Title: Directed Energy/Electronic Combat</p> <p>Description: Directed Energy/Electronic Combat acquires the ability to characterize irradiance and beam properties on aircraft, small Unmanned Aerial Vehicles (UAV) and ground targets and create realistic environments to simulate adversary air defense capabilities in the year 2030. Enables 5th-6th generation weapon testing/tactics development in a threat-realistic Anti-Access Area Denial (A2AD) environment using a combination of indoor and open-air ranges.</p>		33.400	89.033	63.450

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force		Date: May 2021		
Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 6: RDT&E Management Support</i>		R-1 Program Element (Number/Name) PE 0604759F <i>I Major T&E Investment</i>		
C. Accomplishments/Planned Programs (\$ in Millions)		FY 2020	FY 2021	FY 2022
<p><i>FY 2021 Plans:</i> Start of the Advanced Multispectral Development - Phase I (AMD-I) program and outfitting the JSE facilities.</p> <p><i>FY 2022 Plans:</i> Start of the Advanced Multispectral Development - Phase I (AMD-I) program and outfitting the JSE facilities.</p> <p><i>FY 2021 to FY 2022 Increase/Decrease Statement:</i> \$25.6 million decrease as JSE transitions to the end of its AF Major T&E Investment funding and moves into the sustainment phase with AF program element, 65807F, Test and Evaluation Support.</p>				
<p><i>Title:</i> Cyberspace and Avionics Cyber</p> <p><i>Description:</i> Cyberspace and Avionics Cyber is the advancement of cybersecurity/resiliency test capability for network, C41SR and airborne weapon platforms and includes development of tools, techniques and hardware in the loop capabilities focused on cybersecurity and cyber-resiliency.</p> <p><i>FY 2021 Plans:</i> Equip the cyberspace facility and continue the planning and execution of the Weapon System Cybersecurity (WSCS) Program tool development.</p> <p><i>FY 2022 Plans:</i> Equip the cyberspace facility and continue the planning and execution of the Weapon System Cybersecurity (WSCS) Program tool development.</p> <p><i>FY 2021 to FY 2022 Increase/Decrease Statement:</i> \$3.1 million funding increase to equip the Cyber Facility at Eglin AFB.</p>		0.200	9.410	12.505
<p><i>Title:</i> Autonomy</p> <p><i>Description:</i> Autonomy refers to the ability to test autonomous aerial and ground systems with hundreds of independent vehicles. Must be able to monitor system-under-test locations and states with the ability for soft and hard termination. Must develop techniques and processes to test systems with artificial intelligence.</p> <p><i>FY 2021 Plans:</i> In FY21, there are no planned projects but limited funding is available should an opportunity arise.</p> <p><i>FY 2022 Plans:</i> No planned projects but limited funding is available should an opportunity arise.</p> <p><i>FY 2021 to FY 2022 Increase/Decrease Statement:</i></p>		0.200	0.200	0.200

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 6: RDT&E Management Support</i>	R-1 Program Element (Number/Name) PE 0604759F / <i>Major T&E Investment</i>
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C. Accomplishments/Planned Programs (\$ in Millions)	FY 2020	FY 2021	FY 2022
N/A			
Title: Space Description: Space Test Infrastructure refers to the development of a Space Combined Test Force and the development of technical capabilities, both terrestrial and space-based assets, in order to deploy an initial level of ability to test and evaluate the capability and resilience of DoD Space systems in a contested environment. FY 2021 Plans: Provides funding required to establish full spectrum environment to evaluate space system survivability and lethality in a highly contested environment. Leverages initial FY19 investment of \$54 million and \$36 million FY20 congressional add. FY 2022 Plans: None. FY 2021 to FY 2022 Increase/Decrease Statement: \$71 million funding decrease due to FY22 transfer of funding for space threat testing to United States Space Force program element, Major T&E Investment - Space, 1206759SF for execution.	35.868	44.893	0.000
Accomplishments/Planned Programs Subtotals	106.014	208.299	130.766

D. Other Program Funding Summary (\$ in Millions)											
<u>Line Item</u>	<u>FY 2020</u>	<u>FY 2021</u>	<u>FY 2022</u> <u>Base</u>	<u>FY 2022</u> <u>OCO</u>	<u>FY 2022</u> <u>Total</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>FY 2026</u>	<u>Cost To Complete</u>	<u>Total Cost</u>
• RDTE 06 PE 0605807F: <i>Test and Evaluation Support</i>	795.626	761.307	811.032	-	811.032	-	-	-	-	-	-
• RDTE 06 PE 0605976F: <i>Facility Restoration & Modernization - T&E</i>	88.445	70.856	70.788	-	70.788	-	-	-	-	-	-
• RDTE 06 PE 0605978F: <i>Facility Sustainment - T&E Support</i>	29.424	29.826	30.057	-	30.057	-	-	-	-	-	-

Remarks

E. Acquisition Strategy
N/A

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 6: RDT&E Management Support</i>	R-1 Program Element (Number/Name) PE 0605101F / <i>RAND Project Air Force</i>
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COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
Total Program Element	-	33.968	35.738	36.017	0.000	36.017	-	-	-	-	-	-
661110: <i>Project Air Force</i>	-	33.968	35.738	36.017	0.000	36.017	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-	-	-

A. Mission Description and Budget Item Justification

This program provides for continuing analytical research across a broad spectrum of aerospace issues and concerns. The Project AIR FORCE (PAF) research agenda is focused primarily on mid to long-term problems; in addition, PAF provides quick response assistance for senior Air Force officials on high priority, near term issues. Within these areas, PAF addresses difficult and complex, far-reaching and inter-related questions linked to future strategies, approaches and policies, in order to enhance Air Force senior leadership's deliberations and decisionmaking on major issues. The Air Force Steering Group, chaired by the Vice Chief of Staff, reviews, monitors, and approves PAF annual research efforts. Each project is initiated, processed, and approved in accordance with PAF Sponsoring Agreement which requires General Officer (or SES equivalent) sponsorship and involvement on a continuing basis.

PAF is organized in four primary research program areas: strategy and doctrine; force modernization employment; manpower, personnel and training; and resource management. Integrative research projects are also conducted at the division level with direct support provided through the most applicable program. Research programs address organizational crosscutting issues as defined by specific research themes approved by the Air Force Steering Group. These research themes encompass a wide spectrum of topics including external challenges to national security; terrorism and homeland defense; joint and coalition operations; integrated roadmap for ISR capabilities; enhancing, tailoring and reducing infrastructure to meet new force requirements; potential changes to the Active/Reserve/National Guard/Civilian/Contractor manpower mix; and improved weapon system costing.

The research program will continue to build upon research foundations, examining the evolving security environment, emerging threats, national and military strategy, transformation approaches including investment strategies to provide capabilities within changing Defense budgets, operational concepts to meet evolving and increasingly joint missions, exploiting advanced technologies, increasing the effectiveness and efficiency of combat support, and developing the total force (Active/Reserve/National Guard/Civilian/Contractor). These efforts will continue to inform and support the senior Air Force leadership regarding personnel management and training; improving logistical efficiencies and force sustainment; ongoing conflicts and joint operations; force structure capabilities, limitations, and operational concepts; and making force structure tradeoffs within resource constraints to meet future national security and Air Force needs.

Future research will build upon earlier work to continue to help the Air Force to rapidly and appropriately adapt to the changing world environment and emerging threats; continue to modernize and employ its force structure to provide capabilities within changing DoD budgets; assess lessons learned from recent and ongoing conflicts; develop and utilize its total force; and enhance the support of our aerospace forces, ranging from sustainment of the force structure to agile combat support.

PAF research spans functional and organizational boundaries and is managed in a manner to facilitate independence and freedom from organizational bias thereby providing perspectives and insights to senior Air Force leaders free from parochial influences not necessarily in the best interest of the Air Force at large. Benefits of

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force	Date: May 2021
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Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 6: RDT&E Management Support</i>	R-1 Program Element (Number/Name) PE 0605101F / <i>RAND Project Air Force</i>
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independent non-Department of Defense analysis of complex present day and emerging issues are shared beyond the immediacy of the Air Force. PAF study results are given wide dissemination within the DOD on a routine basis and are deposited with the Defense Technical Information Center available to a broad range of qualified government and commercial-sector individuals and activities.

This program is in Budget Activity 6, RDT&E Management Support because this budget activity includes research, development, test and evaluation efforts and funds to sustain and/or modernize the installations or operations required for general research, development, test and evaluation.

B. Program Change Summary (\$ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Previous President's Budget	35.258	35.803	36.558	0.000	36.558
Current President's Budget	33.968	35.738	36.017	0.000	36.017
Total Adjustments	-1.290	-0.065	-0.541	0.000	-0.541
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	-0.065			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	-1.290	0.000			
• Other Adjustments	0.000	0.000	-0.541	0.000	-0.541

C. Accomplishments/Planned Programs (\$ in Millions)	FY 2020	FY 2021	FY 2022
Title: Strategy & Doctrine	8.300	8.480	8.614
Description: Provides for continuing analytical research across a broad spectrum of aerospace issues and concerns--strategy and doctrine.			
FY 2021 Plans: Continuing analytical research across a broad spectrum of aerospace issues and concerns--integrative research/direct support			
FY 2022 Plans: Will conduct analytical research across a broad spectrum of aerospace issues and concerns--integrative research/direct support			
FY 2021 to FY 2022 Increase/Decrease Statement: Increase due to the increased Scientific Technical Equivalent Rate.			
Title: Force Development	7.050	8.361	8.201

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force		Date: May 2021		
Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 6: RDT&E Management Support</i>		R-1 Program Element (Number/Name) PE 0605101F / <i>RAND Project Air Force</i>		
C. Accomplishments/Planned Programs (\$ in Millions)		FY 2020	FY 2021	FY 2022
<p>Description: Provides analytical research across a broad spectrum of aerospace issues and concerns--force development employment.</p> <p>FY 2021 Plans: Continuing analytical research across a broad spectrum of aerospace issues and concerns--force development employment.</p> <p>FY 2022 Plans: Will conduct analytical research across a broad spectrum of aerospace issues and concerns--force development employment.</p> <p>FY 2021 to FY 2022 Increase/Decrease Statement: Decrease due to the increased Scientific Technical Equivalent Rate.</p>				
<p>Title: Manpower, Personnel & Training</p> <p>Description: Provides analytical research across a broad spectrum of aerospace issues and concerns--manpower, personnel and training.</p> <p>FY 2021 Plans: Continuing analytical research across a broad spectrum of aerospace issues and concerns--manpower, personnel and training.</p> <p>FY 2022 Plans: Will conduct analytical research across a broad spectrum of aerospace issues and concerns--manpower, personnel and training.</p> <p>FY 2021 to FY 2022 Increase/Decrease Statement: Increase due to the increased Scientific Technical Equivalent Rate.</p>		8.340	8.480	8.623
<p>Title: Resource Management</p> <p>Description: Provides analytical research across a broad spectrum of aerospace issues and concerns--resource management.</p> <p>FY 2021 Plans: Continuing analytical research across a broad spectrum of aerospace issues and concerns--manpower, personnel and training.</p> <p>FY 2022 Plans: Will conduct analytical research across a broad spectrum of aerospace issues and concerns--manpower, personnel and training.</p> <p>FY 2021 to FY 2022 Increase/Decrease Statement: Increase due to the increased Scientific Technical Equivalent Rate.</p>		8.340	8.480	8.580
<p>Title: Integrative Research/Direct Support</p>		1.938	1.937	1.999

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force	Date: May 2021
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Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 6: RDT&E Management Support</i>	R-1 Program Element (Number/Name) PE 0605101F / <i>RAND Project Air Force</i>
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C. Accomplishments/Planned Programs (\$ in Millions)	FY 2020	FY 2021	FY 2022
<p>Description: Provides for continuing analytical research across a broad spectrum of aerospace issues and concerns--integrative research/direct support.</p> <p>FY 2021 Plans: Continuing analytical research across a broad spectrum of aerospace issues and concerns--integrative research/direct support.</p> <p>FY 2022 Plans: Will conduct analytical research across a broad spectrum of aerospace issues and concerns--integrative research/direct support.</p> <p>FY 2021 to FY 2022 Increase/Decrease Statement: Increase due to the increased Scientific Technical Equivalent Rate.</p>			
Accomplishments/Planned Programs Subtotals	33.968	35.738	36.017

D. Other Program Funding Summary (\$ in Millions)

N/A

Remarks

E. Acquisition Strategy

N/A

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 6: RDT&E Management Support</i>	R-1 Program Element (Number/Name) PE 0605502F / <i>Small Business Innovation Research</i>
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COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
Total Program Element	-	884.237	0.000	0.000	0.000	0.000	-	-	-	-	-	-
663005: <i>Small Business Innovation Research</i>	-	884.237	0.000	0.000	0.000	0.000	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This program implements 15 U.S.C., Section 638 to maximize the creative, innovative, and entrepreneurial spirit of small businesses to solve technological problems.

In Jan 2021, the Secretary of the Air Force named the AFWERX Director as the Chief Commercialization Officer and aligned the Department of the Air Force's (DAF) Small Business Innovation Research (SBIR) and Small Business Technology Transfer (STTR) Programs in AFWERX. While all stages of research and development align to the SBIR/STTR program, commercialization to Phase III transition is the focused goal. Leveraging SBIR/STTR funding, the AFWERX mission is to transition agile, affordable, and accelerated capabilities by teaming commercial technology developers with Airmen and Guardian talent. AFWERX will accomplish this mission through (i) connecting diverse, innovative industry, academia, and government individuals; (ii) creating capability options and prototype opportunities for the Air Force and Space Force; (iii) facilitating streamlined acquisition processes; and (iv) fostering a culture of innovation.

This Program Element (PE) has a direct tie to PE 64317F (Technology Transfer) Project 646030 (AFWERX) and PE 64858F (Tech Transition Program) Project 640858 (Agility Prime) as this program improves Air Force and Space Force capabilities by connecting innovators, simplifying technology transfer, and accelerating results.

This document reflects actual FY 2020 3600 funds aligned to the SBIR/STTR program in accordance with the legislative authority to direct 3.65% of enacted funds anticipated for extramural awards to the program. Funds to resource this program for FY 2021 and forward will be applied to this PE and highlighted as actuals in each subsequent President's Budget submission.

Funding is spread across multiple focus areas and change from year to year based on known and emerging technology gaps, warfighting demand signals, and broader assessments of the military industrial base in light of its reliance on foundational commercial industries. Expected proportional execution of SBIR/STTR funds in each fiscal year's focus area, as well as a description of each of these areas, is provided below. Actuals may vary depending on allocation of actual funds received, timeliness of funds availability, or changes to strategic guidance or executive priorities.

Legacy funding accounts for pre-existing topics (i.e., prior to FY 2020) that either have select notices for Phase IIs or would like to release a Request For Proposal for a Phase II award. This budget allocation category will be phased out by FY 2023. Defense focused funding is dedicated for defense-focused technologies that do not have clear non-defense potential in the near term. Dual use funding is dedicated for dual-use technologies that have clear non-defense and defense applicability.

FY 2020 SBIR/STTR funds are allocated as follows:

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 6: RDT&E Management Support</i>	R-1 Program Element (Number/Name) PE 0605502F / <i>Small Business Innovation Research</i>	
<p>Legacy: 17% Defense Focused: 8% Dual Use: 66% Strategic Fund Increase (STRATFI): 5% - In FY 2020, the DAF introduced STRATFI program. The STRATFI program re-imagines follow-on Phase II efforts to allow for longer, larger scale awards which provide the time and funding necessary to transition technologies over the valley of death - from prototype to program of record. The STRATFI program allows for up to 15 million of SBIR/STTR funds per effort, depending on individual effort approval from the Small Business Administration (SBA). Given strategic level requirements, it also requires matched funding, i.e., 2:1 or 1:2:1 (2 Government non-SBIR to 1 SBIR or 1 Government non-SBIR to 2 Private to 1 SBIR) matching. Administrative: 4%</p> <p>FY 2021 SBIR/STTR funds are intended to be allocated as follows: Legacy: 18% Defense Focused: 16% Dual Use: 41% Supplemental Funding Pilot Program (SFPP): 21% - In FY 2021, the DAF introduced the SFPP. SFPP expands STRATFI initiative with the Tactical Funding Increase (TACFI) program. The TACFI program supports smaller scale, tactical level requirements (e.g., on-going operations at a Wing or Delta). The TACFI program allows for up to 1.7 million of SBIR/STTR funds per effort, and may also require individual effort approval from the SBA. Given smaller amounts of supplemental funding as compared to STRATFI, TACFI requires a lower matched funding ratio at 1:1 (1 Government non-SBIR to 1 SBIR OR 1 Private to 1 SBIR) matching. Administrative: 4%</p> <p>FY 2022 SBIR/STTR funds are intended to be allocated as follows: Legacy: 2% Defense Focused: 20% Dual Use: 54% SFPP: 20% Administrative: 4%</p> <p>The budget for this program is implemented after an appropriation is passed as directed in provisions of 15 U.S.C., Section 638.</p> <p>This program element includes necessary civilian pay and program management administration expenses required to manage, execute and deliver Small Business Innovation Research and Small Business Technology Transfer activities.</p> <p>This program is in Budget Activity 6, RDT&E Management Support because this budget activity includes research, development, test and evaluation efforts and funds to sustain and/or modernize the installations or operations required for general research, development, test and evaluation.</p>		

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force				Date: May 2021		
Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force</i> / BA 6: <i>RDT&E Management Support</i>		R-1 Program Element (Number/Name) PE 0605502F / <i>Small Business Innovation Research</i>				
B. Program Change Summary (\$ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	
Previous President's Budget	0.000	0.000	0.000	0.000	0.000	
Current President's Budget	884.237	0.000	0.000	0.000	0.000	
Total Adjustments	884.237	0.000	0.000	0.000	0.000	
• Congressional General Reductions	0.000	0.000				
• Congressional Directed Reductions	0.000	0.000				
• Congressional Rescissions	0.000	0.000				
• Congressional Adds	0.000	0.000				
• Congressional Directed Transfers	0.000	0.000				
• Reprogrammings	0.000	0.000				
• SBIR/STTR Transfer	884.237	0.000				
• Other Adjustments	0.000	0.000	0.000	0.000	0.000	
C. Accomplishments/Planned Programs (\$ in Millions)				FY 2020	FY 2021	FY 2022
Title: Small Business Innovation Research & Small Business Technology Transfer				884.237	0.000	0.000
Description: Implements 15 U.S.C., Section 638 for Air Force Small Business Innovation Research (SBIR) and Small Business Technology Transfer (STTR) efforts, including associated program management and civilian manpower costs to run the Air Force SBIR and STTR programs.						
FY 2021 Plans: Not applicable						
FY 2022 Plans: Not applicable						
FY 2021 to FY 2022 Increase/Decrease Statement: Not applicable						
Accomplishments/Planned Programs Subtotals				884.237	0.000	0.000
D. Other Program Funding Summary (\$ in Millions)						
N/A						
Remarks						
E. Acquisition Strategy						
Not applicable						

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 6: RDT&E Management Support</i>	R-1 Program Element (Number/Name) PE 0605712F / <i>Initial Operational Test & Evaluation</i>
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COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
Total Program Element	-	13.288	13.532	12.582	0.000	12.582	-	-	-	-	-	-
660191: <i>Initial Operational Test and Eval</i>	-	13.288	13.532	12.582	0.000	12.582	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-	-	-

A. Mission Description and Budget Item Justification

The program element funds the Air Force Operational and Test Center (AFOTEC) to conduct Congressionally mandated Initial Operational Test and Evaluation (IOT&E) to support major weapon system acquisition decisions beyond Low-Rate Initial Production (LRIP), Milestone C, full rate production, fielding, and declaration of Initial Operational Capability (IOC). For Major Defense Acquisition Programs (MDAP), the law requires IOT&E be completed under realistic operating conditions before proceeding beyond LRIP. IOT&E is planned to answer all critical operational issues (COI) as thoroughly as possible. IOT&E is conducted to determine the operational effectiveness and suitability, and resolve overall mission capability, of systems undergoing research and development (R&D) efforts. It is an evaluation of a system's performance when the complete system is tested and evaluated against operational criteria by personnel with the same qualifications as those who will operate, maintain and support the system when deployed. In general, IOT&E is performed on new systems in development, major modifications, and other systems as directed. This PE also funds participation in Multiservice Operational Test and Evaluation (MOT&E), and Follow-on Operational Test and Evaluation (FOT&E) when it is the continuation of IOT&E activities past the full rate production decision. FOT&E answers specific questions about unresolved COIs and test issues or completes areas not finished during the IOT&E. Lastly, this PE funds related operational test and evaluation (OT&E) activities such as conducting Early Influence, agile release tests, Integrated Test and Evaluation (IT&E), Operational Utility Evaluations (OUE), Early Operational Assessments (EOA), and Operational Assessments (OA). These tests support releases and major milestones and decision points prior to Milestone C, full rate production, fielding, or declaration of IOC. IOT&E programs are identified in four system categories: Air; Weapons; Command, Control, Communications, Computers, Intelligence, Surveillance and Reconnaissance (C4ISR); and Combat Support. This program element is driven by Congressional and DoD acquisition mandated requirements for operational testing. AFOTEC schedules and executes tests according to the forecasted test readiness of the MDAP program offices.

This program is in Budget Activity 6, RDT&E Management Support because this budget activity includes research, development, test and evaluation efforts and funds to sustain and/or modernize the installations or operations required for general research, development, test and evaluation.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force	Date: May 2021
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Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 6: RDT&E Management Support</i>	R-1 Program Element (Number/Name) PE 0605712F / <i>Initial Operational Test & Evaluation</i>
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B. Program Change Summary (\$ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Previous President's Budget	13.793	13.557	14.233	0.000	14.233
Current President's Budget	13.288	13.532	12.582	0.000	12.582
Total Adjustments	-0.505	-0.025	-1.651	0.000	-1.651
• Congressional General Reductions	0.000	-0.025			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	-0.505	0.000			
• Other Adjustments	0.000	0.000	-1.651	0.000	-1.651

Change Summary Explanation

In FY22, the Department of the Air Force transferred \$1.5 million of AFOTEC funding for testing of space programs to the United States Space Force (USSF) program, Major T&E Investment- Space, 1206759SF.

C. Accomplishments/Planned Programs (\$ in Millions)	FY 2020	FY 2021	FY 2022
Title: Air Systems OT&E	0.887	6.400	7.417
Description: Plan, execute and report OT&E for Air Systems			
FY 2021 Plans:			
-Airborne Warning and Control System (AWACS) Block 40/45: Conduct FOT&E			
-B-52 Commercial Engine Replacement Program (B-52 CERP): Conduct early influence			
-B-52 Radar Modernization Program (B-52 RMP): Plan for OA			
-Combat Rescue Helicopter (CRH): Conduct IOT&E			
-F-15 Eagle Passive and Active Warning and Survivability System (F-15 EPAWSS): Plan for IOT&E			
-F-15EX: Conduct agile release tests			
-F-22 Capability Pipeline: Conduct agile release tests			
-Global Hawk Ground Segment Modernization Program GH GSMP): Plan for IOT&E			
-KC-46A: Complete IOT&E			
-MH-139: Plan for IOT&E			
-RQ-4B Global Hawk Block 30 Multi-Spectral Intelligence (MSI): Plan for IOT&E			
-T-7A: Plan for OA			
-VC-25B: Conduct OA			

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force		Date: May 2021		
Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 6: RDT&E Management Support</i>		R-1 Program Element (Number/Name) PE 0605712F / <i>Initial Operational Test & Evaluation</i>		
C. Accomplishments/Planned Programs (\$ in Millions)		FY 2020	FY 2021	FY 2022
<p>-Conduct other planning and operational testing for new air system programs as the requirement becomes known to AFOTEC</p> <p>FY 2022 Plans:</p> <ul style="list-style-type: none"> -Airborne Warning and Control System (AWACS) Block 40/45: Complete FOT&E -B-52 Commercial Engine Replacement Program (B-52 CERP): Plan for OUE -B-52 Radar Modernization Program (B-52 RMP): Conduct OA -Combat Rescue Helicopter (CRH): Complete IOT&E -F-15 Eagle Passive and Active Warning and Survivability System (F-15 EPAWSS): Conduct IOT&E -F-15EX: Conduct agile release tests -F-22 Capability Pipeline: Conduct agile release tests -Global Hawk Ground Segment Modernization Program GH GSMP): Conduct IOT&E -MH-139: Conduct IOT&E -RQ-4B Global Hawk Block 30 Multi-Spectral Intelligence (MSI): Conduct IOT&E -T-7A: Conduct OA -VC-25B: Conduct OA 2 <p>-Conduct other planning and operational testing for new air system programs as the requirement becomes known to AFOTEC</p> <p>FY 2021 to FY 2022 Increase/Decrease Statement: Increase in test requirements</p>				
<p>Title: Space Systems OT&E</p> <p>Description: Plan, execute and report OT&E for Space Systems</p> <p>FY 2021 Plans:</p> <ul style="list-style-type: none"> -Air Force and Army Anti-jam Modem (A3M): Conduct agile release tests -Advanced Extremely High Frequency Satellite Communications (Advanced EHF): Plan for FOT&E -Deep Space Advanced Radar Concept (DARC): Conduct agile release tests -Enhanced Polar System Recapitalization (EPS-R): Conduct early influence -Evolved Strategic SATCOM (ESS): Conduct early influence -Family of Advanced Beyond Line Of Sight Terminals (FAB T): Plan for FOT&E -Military GPS User Equipment (GPS MGUE): Conduct OUE 1/2 -GPS Next Generation Control Segment (GPS OCX): Conduct early influence -Integrated Strategic Planning and Analysis Network Increment 5 (ISPAN Inc 5): Conduct agile release tests -Long-Range Discrimination Radar (LRDR): Conduct IOT&E -Next-Generation Overhead Persistent Infrared (Next-Gen OPIR): Conduct agile release tests 		2.737	1.460	0.000

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force		Date: May 2021		
Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 6: RDT&E Management Support</i>		R-1 Program Element (Number/Name) PE 0605712F / <i>Initial Operational Test & Evaluation</i>		
C. Accomplishments/Planned Programs (\$ in Millions)		FY 2020	FY 2021	FY 2022
<ul style="list-style-type: none"> -Nuclear Planning and Execution System Recapitalization (NPES): Conduct OA -Presidential and National Voice Conferencing (PNVC): Plan for MOT&E -Protected Tactical Enterprise Service (PTES): Conduct MOT&E -Protected Tactical SATCOM (PTS): Conduct EOA -Space Based Infrared System (SBIRS): Conduct early influence -Space C2: Conduct IOT&E -Weather System Follow-On Microwave (WSF-M): Plan for OA -Conduct other planning and operational testing for new space system programs as the requirement becomes known to AFOTEC <p>FY 2022 Plans: NA. In FY22, the DAF transferred AFOTEC funding for testing of Space programs to USSF program, Major T&E Investment - Space, 1206759SF.</p> <p>FY 2021 to FY 2022 Increase/Decrease Statement: Decrease of \$1.5 million due to transfer of funding from AF to USSF.</p>				
<p>Title: Weapons Systems OT&E</p> <p>Description: Plan, execute and report OT&E for Weapons Systems</p> <p>FY 2021 Plans:</p> <ul style="list-style-type: none"> -AIM 120D System Improvement Program 3 (AIM-120D SIP-3): Conduct MOT&E -AIM-9X Block II 9.4xx (AIM-9X Blk II 9.4xx): Complete FOT&E -Air Launched Rapid Response Weapon (ARRW): Conduct agile release tests -Golden Horde: Conduct agile release tests -JDAM M-Code: Conduct agile release tests -Conduct other planning and operational testing for new weapons system programs as the requirement becomes known to AFOTEC <p>FY 2022 Plans:</p> <ul style="list-style-type: none"> -Air Launched Rapid Response Weapon (ARRW): Conduct agile release tests -Golden Horde: Conduct agile release tests -JDAM M-Code: Conduct agile release tests -Conduct other planning and operational testing for new weapons system programs as the requirement becomes known to AFOTEC <p>FY 2021 to FY 2022 Increase/Decrease Statement:</p>		2.772	0.588	0.182

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force		Date: May 2021		
Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 6: RDT&E Management Support</i>		R-1 Program Element (Number/Name) PE 0605712F / <i>Initial Operational Test & Evaluation</i>		
C. Accomplishments/Planned Programs (\$ in Millions)		FY 2020	FY 2021	FY 2022
Decrease in test requirements				
Title: C4ISR Systems OT&E		6.497	4.021	4.901
Description: Plan, execute and report OT&E for C4ISR Systems				
FY 2021 Plans:				
-Air Force Integrated Personnel and Pay System (AFIPPS): Plan for IOT&E				
-Air Operations Center Weapon System Modification Program (AOC WS Mod): Conduct agile release tests				
-Distributed Common Ground System (DCGS): Conduct 4 OUEs				
-Force Element Terminal (FET): Conduct agile release tests				
-Integrated Strategic Planning and Analysis Network Increment 5 (ISPAN Inc 5): Conduct agile release tests				
-Joint Cyber Command and Control (JCC2): Conduct agile release tests				
-Nuclear Planning and Execution System Recapitalization (NPES): Conduct OA				
-RQ-4 Global Hawk Block 30/Airborne Signals Intelligence Payload (ASIP): Conduct FOT&E				
-Survivable Airborne Operations Center (SAOC): Conduct agile release tests				
-Three Dimensional Expeditionary Long Range Radar (3DELRR): Plan for IOT&E				
-Unified Platform (UP): Conduct agile release tests				
-Wide Area Surveillance (WAS): Conduct IOT&E				
-Conduct other planning and operational testing for new C4ISR programs as the requirement becomes known to AFOTEC				
FY 2022 Plans:				
-Air Force Integrated Personnel and Pay System (AFIPPS): Conduct IOT&E				
-Air Operations Center Weapon System Modification Program (AOC WS Mod): Conduct agile release tests				
-Integrated Strategic Planning and Analysis Network Increment 5 (ISPAN Inc 5): Conduct agile release tests				
-Joint Cyber Command and Control (JCC2): Conduct agile release tests				
-Nuclear Planning and Execution System Recapitalization (NPES): Conduct OA				
-Survivable Airborne Operations Center (SAOC): Conduct agile release tests				
-Three Dimensional Expeditionary Long Range Radar (3DELRR): Conduct IOT&E				
-Unified Platform (UP): Conduct agile release tests				
-Wide Area Surveillance (WAS): Conduct FOT&E				
-Conduct other planning and operational testing for new C4ISR programs as the requirement becomes known to AFOTEC				
FY 2021 to FY 2022 Increase/Decrease Statement:				
Increase in test requirements				
Title: Combat Support OT&E		0.395	1.063	0.082

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force	Date: May 2021
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Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 6: RDT&E Management Support</i>	R-1 Program Element (Number/Name) PE 0605712F / <i>Initial Operational Test & Evaluation</i>
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C. Accomplishments/Planned Programs (\$ in Millions)	FY 2020	FY 2021	FY 2022
<p>Description: Plan, execute and report OT&E for Combat Support OT&E</p> <p>FY 2021 Plans:</p> <ul style="list-style-type: none"> -Common Munitions Built-In Test Reprogramming Equipment Service Life Extension Program (CMBRE SLEP): Conduct early involvement -Deliberate and Crisis Action Planning and Execution Segments Increment 2B (DCAPES Inc 2B): Conduct agile release tests -Military GPS User Equipment Inc 2 Handheld (MGUE Inc 2 HH): Conduct early involvement -Maintenance, Repair, and Overhaul Initiative (MROI): Conduct IOT&E -Conduct other planning and operational testing for new combat support programs as the requirement becomes known to AFOTEC <p>FY 2022 Plans:</p> <ul style="list-style-type: none"> -Common Munitions Built-In Test Reprogramming Equipment Service Life Extension Program (CMBRE SLEP): Plan for OUE -Deliberate and Crisis Action Planning and Execution Segments Increment 2B (DCAPES Inc 2B): Conduct agile release tests -Military GPS User Equipment Inc 2 Handheld (MGUE Inc 2 HH): Conduct early involvement -Maintenance, Repair, and Overhaul Initiative (MROI): Conduct FOT&E -Conduct other planning and operational testing for new combat support programs as the requirement becomes known to AFOTEC <p>FY 2021 to FY 2022 Increase/Decrease Statement: Decrease in test requirements</p>			
Accomplishments/Planned Programs Subtotals	13.288	13.532	12.582

D. Other Program Funding Summary (\$ in Millions)
N/A

Remarks

E. Acquisition Strategy
N/A

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 6: RDT&E Management Support</i>	R-1 Program Element (Number/Name) PE 0605807F / <i>Test and Evaluation Support</i>
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COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
Total Program Element	-	795.626	761.307	811.032	0.000	811.032	-	-	-	-	-	-
6606TG: <i>704th Test Group</i>	-	37.948	39.914	52.868	0.000	52.868	-	-	-	-	-	-
6606TS: <i>Test and Evaluation Support</i>	-	757.678	721.393	758.164	0.000	758.164	-	-	-	-	-	-

A. Mission Description and Budget Item Justification

This program element provides resources to operate the Air Force Test Center (AFTC) test activities which are included in the Department of Defense (DoD) Major Range and Test Facility Base (MRTFB). Test facilities/capabilities include wind tunnels, rocket and jet engine test cells, hypersonic and subsonic testing, modeling and simulation, technology, limited space environmental simulation chambers, armament test ranges, hardware-in-the-loop test facilities, climatic test facilities, avionics test facilities, aircraft testbeds, dry lake bed landing sites, instrumented test ranges, and test aircraft maintenance, as well as USAF Test Pilot School.

Test and Evaluation (T&E) Support funds institutional test infrastructure activities including: Command and supervisory staffs; supply stocks; maintenance, repair, and replacement of worn or obsolete test equipment and facilities; test infrastructure for data collection, transmission, reduction, and analysis; civilian salaries; temporary duty travel; range operations and material support contract costs for hardware and software engineering and maintenance; and minor improvement and modernization projects. It also funds institutional test aircraft depot level maintenance such as: Programmed Depot Maintenance (PDM), the calendar-based cyclic scheduling of aircraft into depots for update/inspection; modifications and any other depot level repairs required by the aircraft System Program Directors (SPD); engine overhauls; depot-provided area assistance; and assorted ground support equipment overhauls.

Within AFTC there are three test wings. The first is Arnold Engineering and Development Complex (AEDC), located at Arnold Air Force Base (AFB), TN. The AEDC institutional test infrastructure supports operations of the largest complex of ground test facilities in the world (including transonic, supersonic, and hypersonic wind tunnels; rocket motor and turbine engine test cells; space environmental test chambers, hyper ballistic ranges; and other specialized facilities). AEDC also supports geographically separated facilities which include the National Full-Scale Aerodynamic Complex (NFAC) located at NASA's AMES Research Center, California, Tunnel 9 located at White Oak, Maryland, and the McKinley Climatic Lab located on Eglin AFB, Florida. The 412 Test Wing (TW) is located at Edwards AFB, CA. Its institutional test infrastructure supports weapons system development and operational test and evaluation for aircraft, aircraft subsystems and aircraft weapon systems, aerospace research vehicles, unmanned miniature vehicles, cruise missiles, parachute delivery/recovery systems, cargo handling systems, communications, information operations, and Electronic Warfare (EW) systems for DoD and allied forces. The 412TW mission also includes the USAF Test Pilot School. Lastly, the 96 TW, located at Eglin AFB, FL, is a joint test and training complex comprised of 724 square miles of land area, and approximately 123,000 square miles of water area. The 96TW provides the institutional test infrastructure required to conduct developmental and operational test and evaluation of non-nuclear air armaments (including aircraft guns, ammunition, and air-to-surface and air-to-air guided munitions); Command, Control, Communications, Computers and Intelligence/Surveillance/Reconnaissance (C4ISR) systems; target acquisition and weapon delivery systems; and special operations aircraft systems. 96TW provides a scientific test process that supports the development, production, sustainment, and enhancement of munitions systems that support tri-service digital weapons development. T&E support services contracts are awarded on the basis of full and open competition.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force</i> / BA 6: <i>RDT&E Management Support</i>	R-1 Program Element (Number/Name) PE 0605807F / <i>Test and Evaluation Support</i>
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This program is in Budget Activity 6, RDT&E Management Support because this budget activity includes research, development, test and evaluation efforts and funds to sustain and/or modernize the installations or operations required for general research, development, test and evaluation.

B. Program Change Summary (\$ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Previous President's Budget	717.895	764.606	767.210	0.000	767.210
Current President's Budget	795.626	761.307	811.032	0.000	811.032
Total Adjustments	77.731	-3.299	43.822	0.000	43.822
• Congressional General Reductions	0.000	-3.299			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	76.528	0.000			
• Reprogrammings	1.203	0.000			
• SBIR/STTR Transfer	0.000	0.000			
• Other Adjustments	0.000	0.000	43.822	0.000	43.822

Change Summary Explanation

FY20 increase of 78 million included \$51 million of CARES Relief funding, \$26 million of Omnibus funding for civ pay, and \$1.2 million of civ pay BTR. The increase of funds covered the civ pay shortfall caused by an imprecise budgeted Average Work Year Cost (AWYC) and lost reimbursable earnings associated with COVID/DoD travel restrictions impacting scheduled testing. The FY21 PB budgeted 2750 work years at an AWYC of \$.117M; significantly short of actual AWYC of \$.125M and work years of 2809.

FY21 decrease due to 1.4 million undistributed reduction against the RDT&E appropriation and a 1.9 million Section 8130 fuel reduction.

FY22 net increase of \$43.8 million consists of a \$25 million AF investment for hypersonic sustainment at AEDC; \$16.8 million for civ pay repricing, a \$2.3 million adjustment for FY22 performance awards, an increase of \$11 million over FY21 for JSE sustainment, \$8 million increase for program depot maintenance for one F-15 aircraft, an increase of \$5.4 million for the Dynamic RCS range sustainment and a decrease of \$24.4 million from FY21 for increases associated with natural disaster recovery and a restoral of National Full Scale Aerodynamic Complex sustainment funding in FY21 only.

The FY21 PB budgeted 2786 work years at an AWYC of \$.125M for a total of \$348.66 million. The FY22 PB funding increases the budgeted work years to 2978 at an AWYC of \$.131M for a total of \$384.28 million.

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 6					R-1 Program Element (Number/Name) PE 0605807F / Test and Evaluation Support				Project (Number/Name) 6606TG / 704th Test Group			
COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
6606TG: 704th Test Group	-	37.948	39.914	52.868	0.000	52.868	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Project infrastructure support is provided for the unique capabilities of the 704th Test Group (TG) facilities: Central Inertial and Global Positioning System (GPS) Test Facility (CIGTF/746th Test Squadron), the Holloman High Speed Test Track (HHSTT/846th Test Squadron) and the National Radar Cross Section (RCS) Test Facility (NRTF/704 TG Det 2), the 586th Flight Test Squadron including Detachment 1 (Det 1), 704 TG Operating Location (704 TG OL-AA) at Kirtland AFB, and 704 TG Operation Location (704 TG OL-AC) at Wright-Patterson AFB.

CIGTF provides independent test and evaluation of inertial, Global Positioning System, and integrated systems used for aircraft navigation and missile guidance systems, including vulnerability to electronic interference.

HHSTT capabilities include full-scale testing in flight representative environments, realistic live-fire simulations, test item and target fragment recovery, precision trajectory analysis and high speed photography.

NRTF provides radar cross section (RCS) monostatic and bistatic amplitude and phase measurements, antenna pattern measurements, glint and near field measurements for low observable targets.

The 586th Flight Test Squadron executes flight test and test support for advanced avionics and weapons development of joint, international and commercial test programs. Det 1 provides the liaison function for coordinating and scheduling all US Air Force test and training operations at White Sands Missile Range (WSMR). OL-AA provides test support for the Air Force Research Lab (AFRL) Directed Energy Division.

The 704 TG OL-AC includes the Landing Gear Test Facility (LGTF) with capabilities such as variable and fixed inertia dynamometers, compression/tension load applicators, 4 drop towers, a burst pit and a dynamic load simulator. The 704 TG OL-AC also includes the Air Vehicle Survivability Office that provides support for Air Force aircraft acquisition programs. The 704th TG support services contracts are awarded on the basis of full and open competition.

B. Accomplishments/Planned Programs (\$ in Millions)

	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Title: Civ Pay	22.003	23.715	31.207	0.000	31.207
Description: Provide civilian pay at the 704th Test Group (TG) to support testing of DoD, other Government Agencies, foreign military sales, and commercial weapon systems.					
FY 2021 Plans:					

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 6	R-1 Program Element (Number/Name) PE 0605807F / <i>Test and Evaluation Support</i>	Project (Number/Name) 6606TG / <i>704th Test Group</i>
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B. Accomplishments/Planned Programs (\$ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Total for civilian pay. FY 2022 Base Plans: Total for civilian pay. FY 2022 OCO Plans: N/A FY 2021 to FY 2022 Increase/Decrease Statement: Funding increase due to \$7.5 million civ pay increase to fix FY22 AWYC. The budget increase for FY22 PB fully funds workyears at the projected AWYC of \$.131M.					
Title: Non Pay Description: Provide infrastructure at the 704th Test Group (TG) to support testing of DoD, other Government Agencies, foreign military sales, and commercial weapon systems. FY 2021 Plans: Total consists of utilities and contractor services. FY 2022 Base Plans: Total consists of utilities and contractor services. FY 2022 OCO Plans: N/A FY 2021 to FY 2022 Increase/Decrease Statement: Funding increase from FY21 to FY22 is a result of programmed sustainment funding of \$5.6 million for the Dynamic RCS Range.	15.945	16.199	21.661	0.000	21.661
Accomplishments/Planned Programs Subtotals	37.948	39.914	52.868	0.000	52.868

C. Other Program Funding Summary (\$ in Millions)
 N/A
Remarks

D. Acquisition Strategy
 N/A

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force										Date: May 2021		
Appropriation/Budget Activity 3600 / 6					R-1 Program Element (Number/Name) PE 0605807F / <i>Test and Evaluation Support</i>				Project (Number/Name) 6606TS / <i>Test and Evaluation Support</i>			
COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
6606TS: <i>Test and Evaluation Support</i>	-	757.678	721.393	758.164	0.000	758.164	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This program activity provides resources to operate the Air Force Test Center (AFTC) test activities which are included in the Department of Defense (DoD) Major Range and Test Facility Base (MRTFB). Test facilities/capabilities operated through this program include wind tunnels, rocket and jet engine test cells, hypersonic and subsonic testing, modeling and simulation, technology, limited space environmental simulation chambers, armament test ranges, hardware-in-the-loop test facilities, climatic test facilities, avionics test facilities, aircraft testbeds, dry lakebed landing sites, instrumented test ranges, and test aircraft maintenance, as well as USAF Test Pilot School.

Test and Evaluation (T&E) Support funds institutional test infrastructure activities including: Command and supervisory staffs; supply stocks; maintenance, repair, and replacement of worn or obsolete test equipment and facilities; test infrastructure for data collection, transmission, reduction, and analysis; civilian salaries; temporary duty travel; range operations and material support contract costs for hardware and software engineering and maintenance; and minor improvement and modernization projects. It also funds institutional test aircraft depot level maintenance such as: Programmed Depot Maintenance (PDM), the calendar-based cyclic scheduling of aircraft into depots for update/inspection; modifications and any other depot level repairs required by the aircraft System Program Directors (SPD); engine overhauls; depot-provided area assistance; and assorted ground support equipment overhauls.

The AFTCs three test wings are supported by this project: (1) Arnold Engineering and Development Complex (AEDC), located at Arnold Air Force Base (AFB), TN, whose institutional test infrastructure supports operations of the largest complex of ground test facilities in the world (includes transonic, supersonic, and hypersonic wind tunnels; rocket motor and turbine engine test cells; space environmental test chambers, hyperballistic ranges; and other specialized facilities). Included are operations at the National Full-Scale Aerodynamic Complex (NFAC) located at NASA's AMES Research Center, California as well as operations at Tunnel 9 located at White Oak, Maryland.(2) 412 Test Wing (TW), located at Edwards AFB, CA, whose institutional test infrastructure supports weapons system development and operational test and evaluation for aircraft, aircraft subsystems and aircraft weapon systems, aerospace research vehicles, unmanned miniature vehicles, cruise missiles, parachute delivery/recovery systems, cargo handling systems, communications, information operations, and Electronic Warfare (EW) systems for DoD and allied forces. The 412TW mission includes the USAF Test Pilot School. (3) 96 TW, located at Eglin AFB, FL, is a joint test and training complex of 724 square miles of land area, and approximately 123,000 square miles of water area. 96TW provides the institutional test infrastructure required to conduct developmental and operational test and evaluation of non-nuclear air armaments (including aircraft guns, ammunition, and air-to-surface and air-to-air guided munitions); Command, Control, Communications, Computers and Intelligence/Surveillance/Reconnaissance (C4ISR) systems; target acquisition and weapon delivery systems; the McKinley Climatic Lab, multi-service climatic simulation capability, located at Eglin AFB, FL; and special operations aircraft systems. 96TW provides a scientific test process that supports the development, production, sustainment, and enhancement of munitions systems that support tri-service digital weapons development. T&E support services contracts are awarded on the basis of full and open competition.

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 6	R-1 Program Element (Number/Name) PE 0605807F / <i>Test and Evaluation Support</i>	Project (Number/Name) 6606TS / <i>Test and Evaluation Support</i>
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B. Accomplishments/Planned Programs (\$ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
<p>Title: Civ Pay</p> <p>Description: Provide civ pay to support testing at Arnold Engineering and Development Complex (AEDC), the 412TW and USAF Test Pilot School at Edwards AFB, and the 96TW at Eglin AFB.</p> <p>FY 2021 Plans: Total consists of civilian pay to support testing at Arnold Engineering and Development Complex (AEDC), the 412TW and USAF Test Pilot School at Edwards AFB, and the 96TW at Eglin AFB.</p> <p>FY 2022 Base Plans: Total consists of civilian pay to support testing at Arnold Engineering and Development Complex (AEDC), the 412TW and USAF Test Pilot School at Edwards AFB, and the 96TW at Eglin AFB.</p> <p>FY 2021 to FY 2022 Increase/Decrease Statement: Net funding increase of 22.6 million due to 5.2 million FY21 civ pay reduction from a prior year and a 27.8 million FY22 civ pay increase composed of a 19.5 million increase for rebalancing the workforce (adds 56 work years) and cover an AWYC shortfall, a FERS adjustment, FY22 performance awards, and a transfer of 8.1 million from Joint Simulation Environment (JSE) non-pay to pay (adds 61 work years). The increase fully funds work years at the projected AWYC of .131M with 2798 FTEs vs. an AWYC of .125M with 2786 FTEs.</p>	330.344	330.292	352.905	-	352.905
<p>Title: Non Pay</p> <p>Description: Provide infrastructure to support testing at Arnold Engineering and Development Complex (AEDC), the 412TW and USAF Test Pilot School at Edwards AFB, and the 96TW at Eglin AFB.</p> <p>FY 2021 Plans: Total consists of utilities, contractor services, and the test and evaluation flying hour program.</p> <p>FY 2022 Base Plans: Total consists of utilities, contractor services, and the test and evaluation flying hour program.</p> <p>FY 2021 to FY 2022 Increase/Decrease Statement: Net funding increase from FY21 to FY22 of \$14 million. The increase can be attributed to an AF investment of 25 million for hypersonic sustainment at AEDC, an increase of \$2.9 million for JSE sustainment after a transfer of 8.4M to civ pay, an increase of \$8 million for programmed depot maintenance for one F-15 aircraft, an increase of \$5.4 million for sustainment of the Dynamic RCS Range and reductions of \$24.4 million for FY21 natural disaster recovery and restoral of National Full Scale Aerodynamic Complex sustainment funding.</p>	427.334	391.101	405.259	-	405.259
Accomplishments/Planned Programs Subtotals	757.678	721.393	758.164	-	758.164

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 6	R-1 Program Element (Number/Name) PE 0605807F / <i>Test and Evaluation Support</i>	Project (Number/Name) 6606TS / <i>Test and Evaluation Support</i>

C. Other Program Funding Summary (\$ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity	R-1 Program Element (Number/Name)											
3600: <i>Research, Development, Test & Evaluation, Air Force I BA 6: RDT&E Management Support</i>	PE 0605826F / Acq Workforce- Global Power											
COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
Total Program Element	-	256.906	270.781	0.000	0.000	0.000	-	-	-	-	-	-
664127: <i>Acq Workforce - Direct</i>	-	256.906	270.781	0.000	0.000	0.000	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

In FY 2022 PEC 0605826F, Acq Workforce Global Power, Project 664127, Acq Workforce Direct was transferred to PE 0605828, Project 665826, Acq Workforce Global Power.

The Air Force Life Cycle Management Center (AFLCMC) equips U.S. and allied forces with operational weapon systems in support of military and national security operations. The acquisition and product support workforce provides cutting edge weapon systems, sustainment capabilities, and is charged with providing management, tools, and technical and business capabilities needed to oversee acquisition programs throughout their life cycle. The direct funded acquisition workforce funded in this program element will support all phases of acquisition programs to include material solution analysis, technology development, engineering and manufacturing development, production and deployment, and operations and support. This funding does not include costs for base operating support civilian personnel.

This program element supports both civilian pay and non-pay support requirements. This program is in Budget Activity 6, RDT&E Management Support because this budget activity includes research, development, test and evaluation efforts and funds to sustain and/or modernize the installations or operations required for general research, development, test and evaluation.

This program is in Budget Activity 6, RDT&E Management Support because this budget activity includes research, development, test and evaluation efforts and funds to sustain and/or modernize the installations or operations required for general research, development, test and evaluation.

B. Program Change Summary (\$ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Previous President's Budget	255.667	0.000	0.000	0.000	0.000
Current President's Budget	256.906	270.781	0.000	0.000	0.000
Total Adjustments	1.239	270.781	0.000	0.000	0.000
• Congressional General Reductions	0.000	-0.495			
• Congressional Directed Reductions	0.000	-1.955			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	273.231			
• Reprogrammings	1.239	0.000			
• SBIR/STTR Transfer	0.000	0.000			
• Other Adjustments	0.000	0.000	0.000	0.000	0.000

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 6: RDT&E Management Support</i>	R-1 Program Element (Number/Name) PE 0605826F / <i>Acq Workforce- Global Power</i>
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Change Summary Explanation

In FY 2020, the \$1.239M increase was due to an approved Above Threshold Reprogramming Request. In FY 2021, the \$270.781M increases was due to a \$273.231M Congressional Directed Transfer and a \$1.955M Congressional Directed reduction - civilian pay prior year carryover and a \$0.495M Congressional General Reduction - excess to need.

C. Accomplishments/Planned Programs (\$ in Millions)

	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
<p>Title: Acquisition Workforce - Civilian Pay</p> <p>Description: The acquisition and product support workforce civilian pay provides cutting edge weapon systems, sustainment capabilities, and is charged with providing management, tools, and technical and business capabilities needed to oversee Global Power acquisition programs throughout their life cycle.</p> <p>FY 2021 Plans: Fund the Global Power acquisition and product support workforce.</p> <p>FY 2022 Base Plans: N/A</p> <p>FY 2022 OCO Plans: N/A</p> <p>FY 2021 to FY 2022 Increase/Decrease Statement: In FY 2022, PE 0605826F, Acq Workforce Global Power, Project 664127, Acq Workforce Direct, was transferred to PE 0605828F, Acq Workforce Global Reach, Project 665826, Acq Workforce Global Power as part of the consolidation of eight AFLCMC Acq Workforce PEs into six PEs. The consolidation enables AFLCMC to better manage variability associated with attrition rates, hiring timelines, demographic changes, and Average Work Year Costs (AWYC) across the AFLCMC enterprise. In addition, the consolidation will reduce the need for technical adjustments, ATRs, and/or BTRs in the year of execution. Finally, the consolidation provides greater flexibility to prevent potential hiring freezes and/or reductions in force. The consolidation maintains transparency associated with funding, authorizations, work years, and AWYC's due to the establishment of new Projects.</p>	249.649	263.935	0.000	0.000	0.000
<p>Title: Acquisition Workforce - Non-Civilian Pay</p> <p>Description: The acquisition and product support workforce provides cutting edge weapon systems, sustainment capabilities, and is charged with providing management, tools, and technical and business capabilities needed to oversee Global Power acquisition programs throughout their life cycle.</p> <p>FY 2021 Plans:</p>	7.257	6.846	0.000	0.000	0.000

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force	Date: May 2021
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Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 6: RDT&E Management Support</i>	R-1 Program Element (Number/Name) PE 0605826F / <i>Acq Workforce- Global Power</i>
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C. Accomplishments/Planned Programs (\$ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Fund the Global Power acquisition and product support workforce. FY 2022 Base Plans: N/A FY 2022 OCO Plans: N/A FY 2021 to FY 2022 Increase/Decrease Statement: In FY 2022, PE 0605826F, Acq Workforce Global Power, Project 664127, Acq Workforce Direct, was transferred to PE 0605828F, Acq Workforce Global Reach, Project 665826, Acq Workforce Global Power as part of the consolidation of eight AFLCMC Acq Workforce PEs into six PEs. The consolidation enables AFLCMC to better manage variability associated with attrition rates, hiring timelines, demographic changes, and Average Work Year Costs (AWYC) across the AFLCMC enterprise. In addition, the consolidation will reduce the need for technical adjustments, ATRs, and/or BTRs in the year of execution. Finally, the consolidation provides greater flexibility to prevent potential hiring freezes and/or reductions in force. The consolidation maintains transparency associated with funding, authorizations, work years, and AWYC's due to the establishment of new Projects.					
Accomplishments/Planned Programs Subtotals	256.906	270.781	0.000	0.000	0.000

D. Other Program Funding Summary (\$ in Millions)
N/A

Remarks

E. Acquisition Strategy
N/A

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 6: RDT&E Management Support</i>	R-1 Program Element (Number/Name) PE 0605827F / <i>Acq Workforce- Global Vig & Combat Sys</i>
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COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
Total Program Element	-	264.506	254.768	243.796	0.000	243.796	-	-	-	-	-	-
664127: <i>Acq Workforce - Direct</i>	-	264.506	254.768	0.000	0.000	0.000	-	-	-	-	-	-
665827: <i>Acq Workforce-Global Vig & Combat Sys</i>	-	0.000	0.000	243.796	0.000	243.796	-	-	-	-	-	-

A. Mission Description and Budget Item Justification

In FY 2022 PEC 0605827F, Acq Workforce Global Vigilance and Combat Systems, Project 664127, Acq Workforce Direct was transferred to PE 0605827, Project 665827, Acq Workforce Vigilance and Combat Systems.

The Air Force Life Cycle Management Center (AFLCMC) equips U.S. and allied forces with operational weapon systems in support of military and national security operations. The acquisition and product support workforce provides cutting edge weapon systems, sustainment capabilities, and is charged with providing management, tools, and technical and business capabilities needed to oversee acquisition programs throughout their life cycle. The direct funded acquisition workforce funded in this program element will support all phases of acquisition programs to include material solution analysis, technology development, engineering and manufacturing development, production and deployment, and operations and support. This funding does not include costs for base operating support civilian personnel.

This program element supports both civilian pay and non-pay support requirements. This program is in Budget Activity 6, RDT&E Management Support because this budget activity includes research, development, test and evaluation efforts and funds to sustain and/or modernize the installations or operations required for general research, development, test and evaluation.

This program is in Budget Activity 6, RDT&E Management Support because this budget activity includes research, development, test and evaluation efforts and funds to sustain and/or modernize the installations or operations required for general research, development, test and evaluation.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force	Date: May 2021
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Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 6: RDT&E Management Support</i>	R-1 Program Element (Number/Name) PE 0605827F / <i>Acq Workforce- Global Vig & Combat Sys</i>
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B. Program Change Summary (\$ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Previous President's Budget	249.992	0.000	0.000	0.000	0.000
Current President's Budget	264.506	254.768	243.796	0.000	243.796
Total Adjustments	14.514	254.768	243.796	0.000	243.796
• Congressional General Reductions	0.000	-0.465			
• Congressional Directed Reductions	0.000	-6.886			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	262.119			
• Reprogrammings	14.514	0.000			
• SBIR/STTR Transfer	0.000	0.000			
• Other Adjustments	0.000	0.000	243.796	0.000	243.796

Change Summary Explanation

In FY 2020, the \$14.514M increase was due to an approved \$6.389M Above Threshold Reprogramming and a \$8.125M Below Threshold Reprogramming. In FY 2021, the \$254.768M increases was due to a \$262,119 Congressional Directed Transfer and a \$6.886M Congressional Directed reduction - civilian pay prior year carryover and a \$0.465M Congressional General Reduction - excess to need. In FY 2022, funding increase represents a deconsolidation of the previously requested transfer of AFLCMC Acq Workforce PEs into two PEs in the FY 2021 PB.

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 6	R-1 Program Element (Number/Name) PE 0605827F / Acq Workforce- Global Vig & Combat Sys	Project (Number/Name) 664127 / Acq Workforce - Direct
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COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
664127: Acq Workforce - Direct	-	264.506	254.768	0.000	0.000	0.000	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-	-	-

A. Mission Description and Budget Item Justification

The Air Force Life Cycle Management Center (AFLCMC) equips U.S. and allied forces with operational weapon systems in support of military and national security operations. The acquisition and product support workforce provides cutting edge weapon systems, sustainment capabilities, and is charged with providing management, tools, and technical and business capabilities needed to oversee acquisition programs throughout their life cycle. The direct funded acquisition workforce funded in this program element will support all phases of acquisition programs to include material solution analysis, technology development, engineering and manufacturing development, production and deployment, and operations and support. This funding does not include costs for base operating support civilian personnel. These program elements support both civilian pay and non-pay support requirements.

B. Accomplishments/Planned Programs (\$ in Millions)

	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Title: Acquisition Workforce - Civilian Pay	264.406	254.668	0.000	0.000	0.000
Description: The acquisition and product support workforce civilian pay provides cutting edge weapon systems, sustainment capabilities, and is charged with providing management, tools, and technical and business capabilities needed to oversee Global Vigilance and Combat Systems acquisition programs throughout their life cycle.					
FY 2021 Plans: Fund the Global Vigilance and Combat Systems acquisition and product support workforce.					
FY 2022 Base Plans: N/A					
FY 2022 OCO Plans: N/A					
FY 2021 to FY 2022 Increase/Decrease Statement: In FY 2022 PEC 0605827F, Acq Workforce Global Vigilance and Combat Systems, Project 664127, Acq Workforce Direct was transferred to PE 0605827, Project 665827, Acq Workforce Vigilance and Combat Systems.					
Title: Acquisition Workforce - Non-Civilian Pay	0.100	0.100	0.000	0.000	0.000

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 6	R-1 Program Element (Number/Name) PE 0605827F / Acq Workforce- Global Vig & Combat Sys	Project (Number/Name) 664127 / Acq Workforce - Direct

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
<p>Description: The acquisition and product support workforce provides cutting edge weapon systems, sustainment capabilities, and is charged with providing management, tools, and technical and business capabilities needed to oversee Global Vigilance and Combat Systems acquisition programs throughout their life cycle.</p> <p>FY 2021 Plans: Fund the Global Vigilance and Combat Systems acquisition and product support workforce.</p> <p>FY 2022 Base Plans: N/A</p> <p>FY 2022 OCO Plans: N/A</p> <p>FY 2021 to FY 2022 Increase/Decrease Statement: In FY 2022 PEC 0605827F, Acq Workforce Global Vigilance and Combat Systems, Project 664127, Acq Workforce Direct was transferred to PE 0605827, Project 665827, Acq Workforce Vigilance and Combat Systems.</p>					
Accomplishments/Planned Programs Subtotals	264.506	254.768	0.000	0.000	0.000

<p>C. Other Program Funding Summary (\$ in Millions) N/A</p> <p>Remarks</p> <p>D. Acquisition Strategy N/A</p>

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 6					R-1 Program Element (Number/Name) PE 0605827F / Acq Workforce- Global Vig & Combat Sys			Project (Number/Name) 665827 / Acq Workforce-Global Vig & Combat Sys				
COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
665827: Acq Workforce-Global Vig & Combat Sys	-	0.000	0.000	243.796	0.000	243.796	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Air Force Life Cycle Management Center (AFLCMC) equips U.S. and allied forces with operational weapon systems in support of military and national security operations. The acquisition and product support workforce provides cutting edge weapon systems, sustainment capabilities, and is charged with providing management, tools, and technical and business capabilities needed to oversee acquisition programs throughout their life cycle. The direct funded acquisition workforce funded in this program element will support all phases of acquisition programs to include material solution analysis, technology development, engineering and manufacturing development, production and deployment, and operations and support. This funding does not include costs for base operating support civilian personnel. These program elements support both civilian pay and non-pay support requirements.

B. Accomplishments/Planned Programs (\$ in Millions)

	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Title: Acquisition Workforce - Civilian Pay	-	0.000	243.696	0.000	243.696
Description: The acquisition and product support workforce civilian pay provides cutting edge weapon systems, sustainment capabilities, and is charged with providing management, tools, and technical and business capabilities needed to oversee Global Vigilance and Combat Systems acquisition programs throughout their life cycle.					
FY 2021 Plans: N/A					
FY 2022 Base Plans: Fund the Global Vigilance and Combat Systems acquisition and product support workforce.					
FY 2022 OCO Plans: N/A					
FY 2021 to FY 2022 Increase/Decrease Statement: The FY 2021 civilian pay budget appropriated in PE 0605827F Project 664127 is \$254.668M for 1,959 authorizations at an average work year cost of \$0.133M.					

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 6	R-1 Program Element (Number/Name) PE 0605827F / Acq Workforce- Global Vig & Combat Sys	Project (Number/Name) 665827 / Acq Workforce-Global Vig & Combat Sys

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
The FY 2022 PB \$243.696M request in PE 0605827F Project 665827 supports 1,959 authorizations at an average work year cost (AWYC) of \$0.136M.					
The \$10.972M FY 2020 to FY 2021 decrease is a result of decreased AWYC funding.					
Title: Acquisition Workforce - Non-Civilian Pay Description: The acquisition and product support workforce provides cutting edge weapon systems, sustainment capabilities, and is charged with providing management, tools, and technical and business capabilities needed to oversee Global Vigilance and Combat Systems acquisition programs throughout their life cycle. FY 2021 Plans: N/A FY 2022 Base Plans: Fund the Global Vigilance and Combat Systems acquisition and product support workforce. FY 2022 OCO Plans: N/A FY 2021 to FY 2022 Increase/Decrease Statement: In FY 2022 PEC 0605827F, Acq Workforce Global Vigilance and Combat Systems, Project 664127, Acq Workforce Direct was transferred to PE 0605827, Project 665827, Acq Workforce Vigilance and Combat Systems.	-	0.000	0.100	0.000	0.100
Accomplishments/Planned Programs Subtotals	-	0.000	243.796	0.000	243.796

C. Other Program Funding Summary (\$ in Millions) N/A
Remarks
D. Acquisition Strategy N/A

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 6: RDT&E Management Support</i>	R-1 Program Element (Number/Name) PE 0605828F / <i>Acq Workforce- Global Reach</i>
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COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
Total Program Element	-	159.011	157.964	435.930	0.000	435.930	-	-	-	-	-	-
664127: <i>Acq Workforce - Direct</i>	-	159.011	157.964	0.000	0.000	0.000	-	-	-	-	-	-
665826: <i>acq workforce-global power</i>	-	0.000	0.000	276.365	0.000	276.365	-	-	-	-	-	-
665828: <i>Acq Workforce-Global Reach</i>	-	0.000	0.000	159.565	0.000	159.565	-	-	-	-	-	-

A. Mission Description and Budget Item Justification

In FY 2022 PEC 0605828F, Acq Workforce Global Reach, Project 664127, Acq Workforce Direct was transferred to PE 0605828F, Project 665826, Acq Workforce Global Reach. In addition, in FY 2022 PEC 0605826F, Acq Workforce Global Power, Project 664127, Acq Workforce Direct was transferred to PE 0605828, Project 665826, Acq Workforce Global Power.

The Air Force Life Cycle Management Center (AFLCMC) equips U.S. and allied forces with operational weapon systems in support of military and national security operations. The acquisition and product support workforce provides cutting edge weapon systems, sustainment capabilities, and is charged with providing management, tools, and technical and business capabilities needed to oversee acquisition programs throughout their life cycle. The direct funded acquisition workforce funded in this program element will support all phases of acquisition programs to include material solution analysis, technology development, engineering and manufacturing development, production and deployment, and operations and support. This funding does not include costs for base operating support civilian personnel.

This program element supports both civilian pay and non-pay support requirements. This program is in Budget Activity 6, RDT&E Management Support because this budget activity includes research, development, test and evaluation efforts and funds to sustain and/or modernize the installations or operations required for general research, development, test and evaluation.

This program is in Budget Activity 6, RDT&E Management Support because this budget activity includes research, development, test and evaluation efforts and funds to sustain and/or modernize the installations or operations required for general research, development, test and evaluation.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force	Date: May 2021
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Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 6: RDT&E Management Support</i>	R-1 Program Element (Number/Name) PE 0605828F / <i>Acq Workforce- Global Reach</i>
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B. Program Change Summary (\$ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Previous President's Budget	149.191	0.000	0.000	0.000	0.000
Current President's Budget	159.011	157.964	435.930	0.000	435.930
Total Adjustments	9.820	157.964	435.930	0.000	435.930
• Congressional General Reductions	0.000	-0.289			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	158.429			
• Reprogrammings	9.820	0.000			
• SBIR/STTR Transfer	0.000	0.000			
• Other Adjustments	0.000	-0.176	435.930	0.000	435.930

Change Summary Explanation

In FY 2020, the \$9.820M increase was due to an approved \$8.252M Above Threshold Reprogramming and a \$1.567M Below Threshold Reprogramming. In FY 2021, the \$158.140M increases was due to a \$158.429M Congressional Directed Transfer, a \$0.289M Congressional General Reduction, and a \$0.176M adjustment. In FY 2022, funding increase represents a deconsolidation of the previously requested transfer of AFLCMC Acq Workforce PEs into two PEs in the FY 2021 PB. In addition, in FY 2022 PEC 0605826F, Acq Workforce Global Power, Project 664127, Acq Workforce Direct was transferred to PE 0605828, Project 665826, Acq Workforce Global Power.

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 6	R-1 Program Element (Number/Name) PE 0605828F / Acq Workforce- Global Reach	Project (Number/Name) 664127 / Acq Workforce - Direct
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COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
664127: Acq Workforce - Direct	-	159.011	157.964	0.000	0.000	0.000	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-	-	-

A. Mission Description and Budget Item Justification

The Air Force Life Cycle Management Center (AFLCMC) equips U.S. and allied forces with operational weapon systems in support of military and national security operations. The acquisition and product support workforce provides cutting edge weapon systems, sustainment capabilities, and is charged with providing management, tools, and technical and business capabilities needed to oversee acquisition programs throughout their life cycle. The direct funded acquisition workforce funded in this program element will support all phases of acquisition programs to include material solution analysis, technology development, engineering and manufacturing development, production and deployment, and operations and support. This funding does not include costs for base operating support civilian personnel. These program elements support both civilian pay and non-pay support requirements.

B. Accomplishments/Planned Programs (\$ in Millions)

	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Title: Acquisition Workforce - Civilian Pay	158.911	157.864	0.000	0.000	0.000
Description: The acquisition and product support workforce civilian pay provides cutting edge weapon systems, sustainment capabilities, and is charged with providing management, tools, and technical and business capabilities needed to oversee Global Reach acquisition programs throughout their life cycle.					
FY 2021 Plans: The acquisition and product support workforce civilian pay provides cutting edge weapon systems, sustainment capabilities, and is charged with providing management, tools, and technical and business capabilities needed to oversee Global Reach acquisition programs throughout their life cycle.					
FY 2022 Base Plans: N/A					
FY 2022 OCO Plans: N/A					
FY 2021 to FY 2022 Increase/Decrease Statement: In FY 2022 PEC 0605828F, Acq Workforce Global Reach, Project 664127, Acq Workforce Direct was transferred to PE 0605828F, Project 665826, Acq Workforce Global Reach.					
Title: Acquisition Workforce - Non-Civilian Pay	0.100	0.100	0.000	0.000	0.000

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 6	R-1 Program Element (Number/Name) PE 0605828F / Acq Workforce- Global Reach	Project (Number/Name) 664127 / Acq Workforce - Direct

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
<p>Description: The acquisition and product support workforce provides cutting edge weapon systems, sustainment capabilities, and is charged with providing management, tools, and technical and business capabilities needed to oversee Global Reach acquisition programs throughout their life cycle.</p> <p>FY 2021 Plans: Fund the Global Reach acquisition and product support workforce.</p> <p>FY 2022 Base Plans: N/A</p> <p>FY 2022 OCO Plans: N/A</p> <p>FY 2021 to FY 2022 Increase/Decrease Statement: In FY 2022 PEC 0605828F, Acq Workforce Global Reach, Project 664127, Acq Workforce Direct was transferred to PE 0605828F, Project 665826, Acq Workforce Global Reach.</p>					
Accomplishments/Planned Programs Subtotals	159.011	157.964	0.000	0.000	0.000

C. Other Program Funding Summary (\$ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 6					R-1 Program Element (Number/Name) PE 0605828F / Acq Workforce- Global Reach				Project (Number/Name) 665826 / acq workforce-global power			
COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
665826: acq workforce-global power	-	0.000	0.000	276.365	0.000	276.365	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Air Force Life Cycle Management Center (AFLCMC) equips U.S. and allied forces with operational weapon systems in support of military and national security operations. The acquisition and product support workforce provides cutting edge weapon systems, sustainment capabilities, and is charged with providing management, tools, and technical and business capabilities needed to oversee acquisition programs throughout their life cycle. The direct funded acquisition workforce funded in this program element will support all phases of acquisition programs to include material solution analysis, technology development, engineering and manufacturing development, production and deployment, and operations and support. This funding does not include costs for base operating support civilian personnel. These program elements support both civilian pay and non-pay support requirements.

B. Accomplishments/Planned Programs (\$ in Millions)

	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Title: Acquisition Workforce - Civilian Pay	-	0.000	270.914	0.000	270.914
Description: The acquisition and product support workforce civilian pay provides cutting edge weapon systems, sustainment capabilities, and is charged with providing management, tools, and technical and business capabilities needed to oversee Global Power acquisition programs throughout their life cycle.					
FY 2021 Plans: N/A.					
FY 2022 Base Plans: Fund the Global Power acquisition and product support workforce.					
FY 2022 OCO Plans: N/A					
FY 2021 to FY 2022 Increase/Decrease Statement: In FY 2022 PEC 0605826F, Acq Workforce Global Power, Project 664127, Acq Workforce Direct was transferred to PE 0605828, Project 665826, Acq Workforce Global Power.					
The FY 2021 civilian pay budget appropriated for Global Power in PE 0605826F Project 664127 \$263.935M for 589 authorizations at an average work year cost of \$0.134M.					

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 6	R-1 Program Element (Number/Name) PE 0605828F / Acq Workforce- Global Reach	Project (Number/Name) 665826 / acq workforce-global power

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
The FY 2022 PB \$270.914M request in PE 0605828F Project 665827 supports 1,555 authorizations at an average work year cost (AWYC) of \$0.135M. The \$6.979M FY 2021 to FY 2022 increase is a result of additional authorizations.					
Title: Acquisition Workforce - Non-Civilian Pay Description: The acquisition and product support workforce provides cutting edge weapon systems, sustainment capabilities, and is charged with providing management, tools, and technical and business capabilities needed to oversee Global Power acquisition programs throughout their life cycle. FY 2021 Plans: N/A FY 2022 Base Plans: Fund the Global Power Systems acquisition and product support workforce and requirements related to the F-35 Fleet Management Office. FY 2022 OCO Plans: N/A FY 2021 to FY 2022 Increase/Decrease Statement: In FY 2022 PEC 0605826F, Acq Workforce Global Power, Project 664127, Acq Workforce Direct was transferred to PE 0605828, Project 665826, Acq Workforce Global Power.	-	0.000	5.451	0.000	5.451
Accomplishments/Planned Programs Subtotals	-	0.000	276.365	0.000	276.365

C. Other Program Funding Summary (\$ in Millions) N/A
Remarks
D. Acquisition Strategy N/A

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 6					R-1 Program Element (Number/Name) PE 0605828F / Acq Workforce- Global Reach				Project (Number/Name) 665828 / Acq Workforce-Global Reach			
COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
665828: Acq Workforce-Global Reach	-	0.000	0.000	159.565	0.000	159.565	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Air Force Life Cycle Management Center (AFLCMC) equips U.S. and allied forces with operational weapon systems in support of military and national security operations. The acquisition and product support workforce provides cutting edge weapon systems, sustainment capabilities, and is charged with providing management, tools, and technical and business capabilities needed to oversee acquisition programs throughout their life cycle. The direct funded acquisition workforce funded in this program element will support all phases of acquisition programs to include material solution analysis, technology development, engineering and manufacturing development, production and deployment, and operations and support. This funding does not include costs for base operating support civilian personnel. These program elements support both civilian pay and non-pay support requirements.

B. Accomplishments/Planned Programs (\$ in Millions)

	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Title: Acquisition Workforce - Civilian Pay	-	0.000	159.465	0.000	159.465
Description: The acquisition and product support workforce civilian pay provides cutting edge weapon systems, sustainment capabilities, and is charged with providing management, tools, and technical and business capabilities needed to oversee Global Reach acquisition programs throughout their life cycle.					
FY 2021 Plans: N/A					
FY 2022 Base Plans: Fund the Global Reach acquisition and product support workforce.					
FY 2022 OCO Plans: N/A					
FY 2021 to FY 2022 Increase/Decrease Statement: The FY 2021 civilian pay budget appropriated in PE 0605828F Project 664127 is \$158.040M for 589 authorizations at an average work year cost of \$0.134M. The FY 2022 PB \$159.465M request in PE 0605828F Project 665828 supports 1556 authorizations at an average work year cost (AWYC) of \$0.135M.					

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 6	R-1 Program Element (Number/Name) PE 0605828F / Acq Workforce- Global Reach	Project (Number/Name) 665828 / Acq Workforce-Global Reach

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
The \$1.425M FY 2021 to FY 2022 increase is a result of \$0.001M AWYC increase.					
<p>Title: Acquisition Workforce Non-Civilian Pay</p> <p>Description: The acquisition and product support workforce provides cutting edge weapon systems, sustainment capabilities, and is charged with providing management, tools, and technical and business capabilities needed to oversee Global Reach acquisition programs throughout their life cycle.</p> <p>FY 2021 Plans: N/A</p> <p>FY 2022 Base Plans: Fund the Global Reach Systems acquisition and product support workforce.</p> <p>FY 2022 OCO Plans: N/A</p> <p>FY 2021 to FY 2022 Increase/Decrease Statement: In FY 2022 PEC 0605828F, Acq Workforce Global Reach, Project 664127, Acq Workforce Direct was transferred to PE 0605828F, Project 665826, Acq Workforce Global Reach.</p>	-	0.000	0.100	0.000	0.100
Accomplishments/Planned Programs Subtotals	-	0.000	159.565	0.000	159.565

C. Other Program Funding Summary (\$ in Millions) N/A
Remarks
D. Acquisition Strategy N/A

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 6: RDT&E Management Support</i>	R-1 Program Element (Number/Name) PE 0605829F / <i>Acq Workforce- Cyber, Network, & Bus Sys</i>
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COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
Total Program Element	-	241.623	254.838	435.274	0.000	435.274	-	-	-	-	-	-
664127: <i>Acq Workforce - Direct</i>	-	241.623	254.838	0.000	0.000	0.000	-	-	-	-	-	-
665829: <i>acq workforce-cyber network & bus sys</i>	-	0.000	0.000	254.435	0.000	254.435	-	-	-	-	-	-
665830: <i>Acq Workforce-Global Battle Mgmt</i>	-	0.000	0.000	180.839	0.000	180.839	-	-	-	-	-	-

A. Mission Description and Budget Item Justification

In FY 2022 PEC 0605830F, Acq Workforce Global Battle Management, Project 664127, Acq Workforce Direct was transferred to PE 0605829, Project 665830, Acq Workforce Global Battle Management.

The Air Force Life Cycle Management Center (AFLCMC) equips U.S. and allied forces with operational weapon systems in support of military and national security operations. The acquisition and product support workforce provides cutting edge weapon systems, sustainment capabilities, and is charged with providing management, tools, and technical and business capabilities needed to oversee acquisition programs throughout their life cycle. The direct funded acquisition workforce funded in this program element will support all phases of acquisition programs to include material solution analysis, technology development, engineering and manufacturing development, production and deployment, and operations and support. This funding does not include costs for base operating support civilian personnel.

This program element supports both civilian pay and non-pay support requirements. This program is in Budget Activity 6, RDT&E Management Support because this budget activity includes research, development, test and evaluation efforts and funds to sustain and/or modernize the installations or operations required for general research, development, test and evaluation.

This program is in Budget Activity 6, RDT&E Management Support because this budget activity includes research, development, test and evaluation efforts and funds to sustain and/or modernize the installations or operations required for general research, development, test and evaluation.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force	Date: May 2021
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Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 6: RDT&E Management Support</i>	R-1 Program Element (Number/Name) PE 0605829F / <i>Acq Workforce- Cyber, Network, & Bus Sys</i>
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B. Program Change Summary (\$ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Previous President's Budget	235.360	0.000	0.000	0.000	0.000
Current President's Budget	241.623	254.838	435.274	0.000	435.274
Total Adjustments	6.263	254.838	435.274	0.000	435.274
• Congressional General Reductions	0.000	-0.324			
• Congressional Directed Reductions	0.000	-13.306			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	21.000			
• Congressional Directed Transfers	0.000	247.468			
• Reprogrammings	6.263	0.000			
• SBIR/STTR Transfer	0.000	0.000			
• Other Adjustments	0.000	0.000	435.274	0.000	435.274

Change Summary Explanation

In FY 2020, the \$6.263M increase was due to an approved \$6.263M Above Threshold Reprogramming. In FY 2021, the \$254.697M increases was due to a \$247.468M Congressional Directed Transfer, a \$13.306M Congressional Directed Reduction, a \$21.000M Congressional non-pay add, and a \$0.324M Congressional General Reduction - excess to need. In FY 2022, funding increase represents a deconsolidation of the previously requested transfer of AFLCMC Acq Workforce PEs into two PEs in the FY21 PB. In addition, in FY22 PEC 0605830F, Acq Workforce Battle Management, Project 664127, Acq Workforce Direct was transferred to PE 0605829F, Project 665830, Acq Workforce Battle Management.

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 6	R-1 Program Element (Number/Name) PE 0605829F / Acq Workforce- Cyber, Netw ork, & Bus Sys	Project (Number/Name) 664127 / Acq Workforce - Direct
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COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
664127: Acq Workforce - Direct	-	241.623	254.838	0.000	0.000	0.000	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-	-	-

A. Mission Description and Budget Item Justification

The Air Force Life Cycle Management Center (AFLCMC) equips U.S. and allied forces with operational weapon systems in support of military and national security operations. The acquisition and product support workforce provides cutting edge weapon systems, sustainment capabilities, and is charged with providing management, tools, and technical and business capabilities needed to oversee acquisition programs throughout their life cycle. The direct funded acquisition workforce funded in this program element will support all phases of acquisition programs to include material solution analysis, technology development, engineering and manufacturing development, production and deployment, and operations and support. This funding does not include costs for base operating support civilian personnel. These program elements support both civilian pay and non-pay support requirements.

B. Accomplishments/Planned Programs (\$ in Millions)

	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Title: Acquisition Workforce - Civilian Pay	229.971	222.982	0.000	0.000	0.000
Description: The acquisition and product support workforce civilian pay provides cutting edge weapon systems, sustainment capabilities, and is charged with providing management, tools, and technical and business capabilities needed to oversee Cyber, Network, and Business Systems acquisition programs throughout their life cycle.					
FY 2021 Plans: Fund the Cyber, Network, and Business Systems acquisition and product support workforce.					
FY 2022 Base Plans: N/A					
FY 2022 OCO Plans: N/A					
FY 2021 to FY 2022 Increase/Decrease Statement: In FY 2022 PEC 0605829F, Acq Workforce Cyber, Network, and Business Systems, Project 664127, Acq Workforce Direct was transferred to PE 0605828F, Project 665829, Acq Workforce Cyber, Network, and Business Systems.					
Title: Acquisition Workforce - Non-Civilian Pay	11.652	31.856	0.000	0.000	0.000

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 6	R-1 Program Element (Number/Name) PE 0605829F / Acq Workforce- Cyber, Netw ork, & Bus Sys	Project (Number/Name) 664127 / Acq Workforce - Direct

B. Accomplishments/Planned Programs (\$ in Millions)

	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
<p>Description: The acquisition and product support workforce provides cutting edge weapon systems, sustainment capabilities, and is charged with providing management, tools, and technical and business capabilities needed to oversee Cyber, Network, and Business Systems acquisition programs throughout their life cycle.</p> <p>FY 2021 Plans: Cyber, Network, and Business Systems acquisition and product support workforce. FY 2021 includes \$20.000M Congressional Add.</p> <p>FY 2022 Base Plans: N/A</p> <p>FY 2022 OCO Plans: N/A</p> <p>FY 2021 to FY 2022 Increase/Decrease Statement: In FY 2022 PEC 0605829F, Acq Workforce Cyber, Network, and Business Systems, Project 664127, Acq Workforce Direct was transferred to PE 0605828F, Project 665829, Acq Workforce Cyber, Network, and Business Systems.</p>					
Accomplishments/Planned Programs Subtotals	241.623	254.838	0.000	0.000	0.000

C. Other Program Funding Summary (\$ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 6					R-1 Program Element (Number/Name) PE 0605829F / Acq Workforce- Cyber, Network, & Bus Sys			Project (Number/Name) 665829 / acq workforce-cyber network & bus sys				
COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
665829: acq workforce-cyber network & bus sys	-	0.000	0.000	254.435	0.000	254.435	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Air Force Life Cycle Management Center (AFLCMC) equips U.S. and allied forces with operational weapon systems in support of military and national security operations. The acquisition and product support workforce provides cutting edge weapon systems, sustainment capabilities, and is charged with providing management, tools, and technical and business capabilities needed to oversee acquisition programs throughout their life cycle. The direct funded acquisition workforce funded in this program element will support all phases of acquisition programs to include material solution analysis, technology development, engineering and manufacturing development, production and deployment, and operations and support. This funding does not include costs for base operating support civilian personnel. These program elements support both civilian pay and non-pay support requirements.

B. Accomplishments/Planned Programs (\$ in Millions)

	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
<p>Title: Acquisition Workforce - Civilian Pay</p> <p>Description: The acquisition and product support workforce civilian pay provides cutting edge weapon systems, sustainment capabilities, and is charged with providing management, tools, and technical and business capabilities needed to oversee Cyber, Network, and Business Systems acquisition programs throughout their life cycle.</p> <p>FY 2021 Plans: N/A</p> <p>FY 2022 Base Plans: Fund the Cyber, Network, and Business Systems acquisition and product support workforce.</p> <p>FY 2022 OCO Plans: N/A</p> <p>FY 2021 to FY 2022 Increase/Decrease Statement: In FY 2022 PEC 0605829F, Acq Workforce Cyber, Network, and Business Systems, Project 664127, Acq Workforce Direct was transferred to PE 0605828F, Project 665829, Acq Workforce Cyber, Network, and Business Systems.</p>	-	0.000	242.316	0.000	242.316

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 6	R-1 Program Element (Number/Name) PE 0605829F / Acq Workforce- Cyber, Netw ork, & Bus Sys	Project (Number/Name) 665829 / acq workforce-cyber network & bus sys

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
The FY 2021 civilian pay budget appropriated for Cyber, Network, and Business Systems in PE 0605829F Project 664127 \$222.982M for 835 authorizations at an average work year cost of \$0.139M.					
The FY 2022 PB \$242.316M request in PE 0605828F Project 665827 supports 1,712 authorizations at an average work year cost (AWYC) of \$0.142M.					
The \$19.334M FY 2021 to FY 2022 increase is a result of additional authorizations and higher AWYC.					
Title: Acquisition Workforce - Non-Civilian Pay Description: The acquisition and product support workforce provides cutting edge weapon systems, sustainment capabilities, and is charged with providing management, tools, and technical and business capabilities needed to oversee Global Power acquisition programs throughout their life cycle. FY 2021 Plans: N/A FY 2022 Base Plans: Fund the Cyber, Network, and Business Systems acquisition and product support workforce. FY 2022 OCO Plans: N/A FY 2021 to FY 2022 Increase/Decrease Statement: In FY 2022 PEC 0605829F, Acq Workforce Cyber, Network, and Business Systems, Project 664127, Acq Workforce Direct was transferred to PE 0605828F, Project 665829, Acq Workforce Cyber, Network, and Business Systems. FY 2021 PEC 0605829F, Acq Workforce Cyber, Network, and Business Systems, Project 664127, Acq Workforce Direct Non-Civilian Pay includes FY21 Congressional Add of \$20.000M	-	0.000	12.119	0.000	12.119
Accomplishments/Planned Programs Subtotals	-	0.000	254.435	0.000	254.435

C. Other Program Funding Summary (\$ in Millions) N/A
Remarks

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 6	R-1 Program Element (Number/Name) PE 0605829F / <i>Acq Workforce- Cyber, Network, & Bus Sys</i>	Project (Number/Name) 665829 / <i>acq workforce-cyber network & bus sys</i>

D. Acquisition Strategy

N/A

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force										Date: May 2021		
Appropriation/Budget Activity 3600 / 6					R-1 Program Element (Number/Name) PE 0605829F / Acq Workforce- Cyber, Network, & Bus Sys				Project (Number/Name) 665830 / Acq Workforce-Global Battle Mgmt			
COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
665830: Acq Workforce-Global Battle Mgmt	-	0.000	0.000	180.839	0.000	180.839	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Air Force Life Cycle Management Center (AFLCMC) equips U.S. and allied forces with operational weapon systems in support of military and national security operations. The acquisition and product support workforce provides cutting edge weapon systems, sustainment capabilities, and is charged with providing management, tools, and technical and business capabilities needed to oversee acquisition programs throughout their life cycle. The direct funded acquisition workforce funded in this program element will support all phases of acquisition programs to include material solution analysis, technology development, engineering and manufacturing development, production and deployment, and operations and support. This funding does not include costs for base operating support civilian personnel. These program elements support both civilian pay and non-pay support requirements.

B. Accomplishments/Planned Programs (\$ in Millions)

	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Title: Acquisition Workforce - Civilian Pay	-	0.000	180.739	0.000	180.739
Description: The acquisition and product support workforce civilian pay provides cutting edge weapon systems, sustainment capabilities, and is charged with providing management, tools, and technical and business capabilities needed to oversee Cyber, Network, and Business Systems acquisition programs throughout their life cycle.					
FY 2021 Plans: N/A					
FY 2022 Base Plans: Fund the Global Battle Management acquisition and product support workforce.					
FY 2022 OCO Plans: N/A					
FY 2021 to FY 2022 Increase/Decrease Statement: The FY 2021 civilian pay budget appropriated in PE 0605830F Project 664127 is \$177.387M for 1,273 authorizations at an average work year cost of \$0.139M.					

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 6	R-1 Program Element (Number/Name) PE 0605829F / Acq Workforce- Cyber, Network, & Bus Sys	Project (Number/Name) 665830 / Acq Workforce-Global Battle Mgmt

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
The FY 2022 PB \$180.739M request in PE 0605829F Project 665830 supports 1,290 authorizations at an average work year cost (AWYC) of \$0.140M.					
The \$3.352M FY21 to FY22 increase is a result of \$0.001M AWYC increase and additional authorizations.					
Title: Acquisition Workforce - Non-Civilian Pay Description: The acquisition and product support workforce provides cutting edge weapon systems, sustainment capabilities, and is charged with providing management, tools, and technical and business capabilities needed to oversee Cyber, Network, and Business Systems acquisition programs throughout their life cycle. FY 2021 Plans: N/A FY 2022 Base Plans: Fund the Global Battle Management acquisition and product support workforce. FY 2022 OCO Plans: N/A FY 2021 to FY 2022 Increase/Decrease Statement: In FY 2022 PEC 0605830F, Acq Workforce Global Battle Management, Project 664127, Acq Workforce Direct was transferred to PE 0605829F, Project 665830, Acq Workforce Global Battle Management.	-	0.000	0.100	0.000	0.100
Accomplishments/Planned Programs Subtotals	-	0.000	180.839	0.000	180.839

C. Other Program Funding Summary (\$ in Millions) N/A
Remarks
D. Acquisition Strategy N/A

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity	R-1 Program Element (Number/Name)											
3600: <i>Research, Development, Test & Evaluation, Air Force I BA 6: RDT&E Management Support</i>	PE 0605830F / <i>Acq Workforce- Global Battle Mgmt</i>											
COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
Total Program Element	-	166.552	177.811	0.000	0.000	0.000	-	-	-	-	-	-
664127: <i>Acq Workforce - Direct</i>	-	166.552	177.811	0.000	0.000	0.000	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

In FY 2022 PEC 0605830F, Acq Workforce Global Battle Management, Project 664127, Acq Workforce Direct was transferred to PE 0605829, Project 665830, Acq Workforce Global Battle Management.

The Air Force Life Cycle Management Center (AFLCMC) equips U.S. and allied forces with operational weapon systems in support of military and national security operations. The acquisition and product support workforce provides cutting edge weapon systems, sustainment capabilities, and is charged with providing management, tools, and technical and business capabilities needed to oversee acquisition programs throughout their life cycle. The direct funded acquisition workforce funded in this program element will support all phases of acquisition programs to include material solution analysis, technology development, engineering and manufacturing development, production and deployment, and operations and support. This funding does not include costs for base operating support civilian personnel.

This program element supports both civilian pay and non-pay support requirements. This program is in Budget Activity 6, RDT&E Management Support because this budget activity includes research, development, test and evaluation efforts and funds to sustain and/or modernize the installations or operations required for general research, development, test and evaluation.

This program is in Budget Activity 6, RDT&E Management Support because this budget activity includes research, development, test and evaluation efforts and funds to sustain and/or modernize the installations or operations required for general research, development, test and evaluation.

B. Program Change Summary (\$ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Previous President's Budget	160.196	0.000	0.000	0.000	0.000
Current President's Budget	166.552	177.811	0.000	0.000	0.000
Total Adjustments	6.356	177.811	0.000	0.000	0.000
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	-5.296			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	183.107			
• Reprogrammings	6.356	0.000			
• SBIR/STTR Transfer	0.000	0.000			
• Other Adjustments	0.000	0.000	0.000	0.000	0.000

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 6: RDT&E Management Support</i>	R-1 Program Element (Number/Name) PE 0605830F / <i>Acq Workforce- Global Battle Mgmt</i>
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Change Summary Explanation

In FY 2020, the \$6.356M increase was due to an approved \$3.472M Above Threshold Reprogramming and a \$2.884M Below Threshold Reprogramming. In FY 2021, the \$177.811M increases was due to a \$183,107 Congressional Directed Transfer and a \$5.296M Congressional Directed reduction - civilian pay prior year carryover, overestimation of projected civilian positions.

C. Accomplishments/Planned Programs (\$ in Millions)

	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
<p>Title: Acquisition Workforce - Civilian Pay</p> <p>Description: The acquisition and product support workforce provides cutting edge weapon systems, sustainment capabilities, and is charged with providing management, tools, and technical and business capabilities needed to oversee Global Battle Management acquisition programs throughout their life cycle.</p> <p>FY 2021 Plans: Fund the Global Battle Management acquisition and product support workforce.</p> <p>FY 2022 Base Plans: N/A</p> <p>FY 2022 OCO Plans: N/A</p> <p>FY 2021 to FY 2022 Increase/Decrease Statement: In FY 2022, PE 0605830F, Acq Workforce Global Battle Management, Project 664127, Acq Workforce Direct, was transferred to PE 0605829F, Acq Workforce Cyber, Network, & Business Systems, Project 665830, Acq Workforce Global Battle Management as part of the consolidation of eight AFLCMC Acq Workforce PEs into six PEs. The consolidation enables AFLCMC to better manage variability associated with attrition rates, hiring timelines, demographic changes, and Average Work Year Costs (AWYC) across the AFLCMC enterprise. In addition, the consolidation will reduce the need for technical adjustments, ATRs, and/or BTRs in the year of execution. Finally, the consolidation provides greater flexibility to prevent potential hiring freezes and/or reductions in force. The consolidation maintains transparency associated with funding, authorizations, work years, and AWYC's due to the establishment of new Projects.</p>	166.452	177.711	0.000	0.000	0.000
<p>Title: Acquisition Workforce - Non-Civilian Pay</p> <p>Description: The acquisition & product support workforce provides cutting edge weapon systems, sustainment capabilities, and is charged with providing management, tools, and technical and business capabilities needed to oversee Global Battle Management acquisition programs throughout their life cycle.</p>	0.100	0.100	0.000	0.000	0.000

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force	Date: May 2021
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Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force</i> / BA 6: <i>RDT&E Management Support</i>	R-1 Program Element (Number/Name) PE 0605830F / <i>Acq Workforce- Global Battle Mgmt</i>
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C. Accomplishments/Planned Programs (\$ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
<p><i>FY 2021 Plans:</i> Fund the Global Battle Management acquisition and product support workforce.</p> <p><i>FY 2022 Base Plans:</i> N/A</p> <p><i>FY 2022 OCO Plans:</i> N/A</p> <p><i>FY 2021 to FY 2022 Increase/Decrease Statement:</i> In FY 2022, PE 0605830F, Acq Workforce Global Battle Management, Project 664127, Acq Workforce Direct, was transferred to PE 0605829F, Acq Workforce Cyber, Network, & Business Systems, Project 665830, Acq Workforce Global Battle Management as part of the consolidation of eight AFLCMC Acq Workforce PEs into six PEs. The consolidation enables AFLCMC to better manage variability associated with attrition rates, hiring timelines, demographic changes, and Average Work Year Costs (AWYC) across the AFLCMC enterprise. In addition, the consolidation will reduce the need for technical adjustments, ATRs, and/or BTRs in the year of execution. Finally, the consolidation provides greater flexibility to prevent potential hiring freezes and/or reductions in force. The consolidation maintains transparency associated with funding, authorizations, work years, and AWYC's due to the establishment of new Projects.</p>					
Accomplishments/Planned Programs Subtotals	166.552	177.811	0.000	0.000	0.000

D. Other Program Funding Summary (\$ in Millions)
N/A

Remarks

E. Acquisition Strategy
N/A

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 6: RDT&E Management Support</i>	R-1 Program Element (Number/Name) PE 0605831F / <i>Acq Workforce- Capability Integration</i>
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COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
Total Program Element	-	239.728	219.467	243.806	0.000	243.806	-	-	-	-	-	-
664127: <i>Acq Workforce - Direct</i>	-	239.728	219.467	0.000	0.000	0.000	-	-	-	-	-	-
665829: <i>acq workforce-cyber network & bus sys</i>	-	0.000	0.000	2.908	0.000	2.908	-	-	-	-	-	-
665831: <i>Acq Workforce - Capability Integration</i>	-	0.000	0.000	240.898	0.000	240.898	-	-	-	-	-	-

A. Mission Description and Budget Item Justification

The Air Force Life Cycle Management Center (AFLCMC) equips U.S. and allied forces with operational weapon systems in support of military and national security operations. The acquisition and product support workforce provides cutting edge weapon systems, sustainment capabilities, and is charged with providing management, tools, and technical and business capabilities needed to oversee acquisition programs throughout their life cycle. The direct funded acquisition workforce funded in this program element will support all phases of acquisition programs to include material solution analysis, technology development, engineering and manufacturing development, production and deployment, and operations and support. This funding does not include costs for base operating support civilian personnel.

This program element supports both civilian pay and non-pay support requirements. This program is in Budget Activity 6, RDT&E Management Support because this budget activity includes research, development, test and evaluation efforts and funds to sustain and/or modernize the installations or operations required for general research, development, test and evaluation.

This program is in Budget Activity 6, RDT&E Management Support because this budget activity includes research, development, test and evaluation efforts and funds to sustain and/or modernize the installations or operations required for general research, development, test and evaluation.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force	Date: May 2021
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Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force</i> / BA 6: <i>RDT&E Management Support</i>	R-1 Program Element (Number/Name) PE 0605831F / <i>Acq Workforce- Capability Integration</i>
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B. Program Change Summary (\$ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Previous President's Budget	228.255	1,362.038	1,389.584	0.000	1,389.584
Current President's Budget	239.728	219.467	243.806	0.000	243.806
Total Adjustments	11.473	-1,142.571	-1,145.778	0.000	-1,145.778
• Congressional General Reductions	0.000	-0.401			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	-1,142.170			
• Reprogrammings	11.473	0.000			
• SBIR/STTR Transfer	0.000	0.000			
• Other Adjustments	0.000	0.000	-1,145.778	0.000	-1,145.778

Change Summary Explanation

In FY 2020, the \$11.474M increase was due to an approved \$9.974M Above Threshold Reprogramming and \$1.500M Below Threshold Reprogramming. In FY 2021, the \$1,142.571M decrease was due to a \$1,142.170M Congressional Directed Transfer and a \$0.401M Congressional General Reduction - excess to need. In FY 2022, funding increase represents a deconsolidation of the previously requested transfer of AFLCMC Acq Workforce PEs into two PEs in the FY 2021 PB.

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 6	R-1 Program Element (Number/Name) PE 0605831F / Acq Workforce- Capability In tegration	Project (Number/Name) 664127 / Acq Workforce - Direct
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COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
664127: Acq Workforce - Direct	-	239.728	219.467	0.000	0.000	0.000	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-	-	-

A. Mission Description and Budget Item Justification

This program element funds the AFLCMC civilian workforce in cross-cutting and mission support organizations such as Plans & Programs, Engineering, Contracting, Financial Management, Logistics, Program Management, Test, Intelligence, Safety, Personnel, Small Business, Inspector General, and Staff Judge Advocate. In addition, this program element funds the AFLCMC civilian workforce directly executing programs such as the Rapid Sustainment Office and the Cyber Resiliency Office for Weapon Systems. The Air Force Life Cycle Management Center (AFLCMC) equips U.S. and allied forces with operational weapon systems in support of military and national security operations. The acquisition and product support workforce provides cutting edge weapon systems, sustainment capabilities, and is charged with providing management, tools, and technical and business capabilities needed to oversee acquisition programs throughout their life cycle. The direct funded acquisition workforce funded in this program element will support all phases of acquisition programs to include material solution analysis, technology development, engineering and manufacturing development, production and deployment, and operations and support. This funding does not include costs for base operating support civilian personnel. These program elements support both civilian pay and non-pay support requirements.

B. Accomplishments/Planned Programs (\$ in Millions)

	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Title: Acquisition Workforce - Civilian Pay	214.124	201.654	0.000	0.000	0.000
Description: The acquisition and product support workforce civilian pay provides cutting edge weapon systems, sustainment capabilities, and is charged with providing management, tools, and technical and business capabilities needed to oversee acquisition programs throughout their life cycle.					
FY 2021 Plans: Fund the Capability Integration acquisition and product support workforce.					
FY 2022 Base Plans: N/A					
FY 2022 OCO Plans: N/A					
FY 2021 to FY 2022 Increase/Decrease Statement: In FY 2022 PEC 0605831F, Capability Integration, Project 664127, Acq Workforce Direct was transferred to PE 0605831F, Project 665831, Capability Integration.					
Title: Acquisition Workforce - Non-Civilian Pay	25.604	17.813	0.000	0.000	0.000

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 6	R-1 Program Element (Number/Name) PE 0605831F / Acq Workforce- Capability In tegration	Project (Number/Name) 664127 / Acq Workforce - Direct

B. Accomplishments/Planned Programs (\$ in Millions)

	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
<p>Description: The acquisition and product support workforce provides cutting edge weapon systems, sustainment capabilities, and is charged with providing management, tools, and technical and business capabilities needed to oversee Capability Integration acquisition programs throughout their life cycle.</p> <p>FY 2021 Plans: Fund the Capability Integration acquisition and product support workforce.</p> <p>FY 2022 Base Plans: N/A</p> <p>FY 2022 OCO Plans: N/A</p> <p>FY 2021 to FY 2022 Increase/Decrease Statement: In FY 2022 PEC 0605831F, Capability Integration, Project 664127, Acq Workforce Direct was transferred to PE 0605831F, Project 665831, Capability Integration.</p>					
Accomplishments/Planned Programs Subtotals	239.728	219.467	0.000	0.000	0.000

C. Other Program Funding Summary (\$ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force										Date: May 2021		
Appropriation/Budget Activity 3600 / 6					R-1 Program Element (Number/Name) PE 0605831F / Acq Workforce- Capability In tegration				Project (Number/Name) 665829 / acq workforce-cyber network & bus sys			
COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
665829: acq workforce-cyber network & bus sys	-	0.000	0.000	2.908	0.000	2.908	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This program element funds the AFLCMC civilian workforce in the Business and Enterprise Systems Program Executive Office and the Command, Control, Communications, and Intelligence Program Executive Office. AFLCMC equips U.S. and allied forces with operational weapon systems in support of military and national security operations. The acquisition and product support workforce provides cutting edge weapon systems, sustainment capabilities, and is charged with providing management, tools, and technical and business capabilities needed to oversee acquisition programs throughout their life cycle. The direct funded acquisition workforce funded in this project will support all phases of acquisition programs to include material solution analysis, technology development, engineering and manufacturing development, production and deployment, and operations and support. This funding does not include costs for base operating support civilian personnel. This project supports both civilian pay and non-pay support requirements.

B. Accomplishments/Planned Programs (\$ in Millions)

	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Title: Acquisition Workforce - Civilian Pay	0.000	0.000	0.000	-	0.000
Description: The acquisition and product support workforce provides cutting edge weapon systems, sustainment capabilities, and is charged with providing management, tools, and technical business capabilities needed to oversee Cyber, Network, and Business System acquisition programs throughout their life cycle.					
FY 2021 Plans: N/A					
FY 2022 Base Plans: N/A					
FY 2021 to FY 2022 Increase/Decrease Statement: N/A					
Title: Acquisition Workforce - Non-Civilian Pay	0.000	0.000	2.908	-	2.908
Description: The acquisition and product support workforce provides cutting edge weapon systems, sustainment capabilities, and is charged with providing management, tools, and technical business capabilities					

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 6	R-1 Program Element (Number/Name) PE 0605831F / Acq Workforce- Capability In tegration	Project (Number/Name) 665829 / acq workforce-cyber network & bus sys

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
needed to oversee Cyber, Network, and Business System acquisition programs throughout their life cycle. This requirement supports non-civilian pay efforts.					
FY 2021 Plans: N/A					
FY 2022 Base Plans: Fund the Cyber, Network, and Business Systems acquisition and product support workforce.					
FY 2021 to FY 2022 Increase/Decrease Statement: Adjust to appropriate PE in future submissions.					
Accomplishments/Planned Programs Subtotals	0.000	0.000	2.908	-	2.908

C. Other Program Funding Summary (\$ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 6					R-1 Program Element (Number/Name) PE 0605831F / Acq Workforce- Capability In tegration				Project (Number/Name) 665831 / Acq Workforce - Capability Integration			
COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
665831: Acq Workforce - Capability Integration	-	0.000	0.000	240.898	0.000	240.898	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This program element funds the AFLCMC civilian workforce in cross-cutting and mission support organizations such as Plans & Programs, Engineering, Contracting, Financial Management, Logistics, Program Management, Test, Intelligence, Safety, Personnel, Small Business, Inspector General, and Staff Judge Advocate. In addition, this program element funds the AFLCMC civilian workforce directly executing programs such as the Rapid Sustainment Office and the Cyber Resiliency Office for Weapon Systems. The Air Force Life Cycle Management Center (AFLCMC) equips U.S. and allied forces with operational weapon systems in support of military and national security operations. The acquisition and product support workforce provides cutting edge weapon systems, sustainment capabilities, and is charged with providing management, tools, and technical and business capabilities needed to oversee acquisition programs throughout their life cycle. The direct funded acquisition workforce funded in this program element will support all phases of acquisition programs to include material solution analysis, technology development, engineering and manufacturing development, production and deployment, and operations and support. This funding does not include costs for base operating support civilian personnel. These program elements support both civilian pay and non-pay support requirements.

B. Accomplishments/Planned Programs (\$ in Millions)

	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Title: Acquisition Workforce - Civilian Pay	-	0.000	222.985	0.000	222.985
Description: The acquisition and product support workforce civilian pay provides cutting edge weapon systems, sustainment capabilities, and is charged with providing management, tools, and technical and business capabilities needed to oversee Capability Integration acquisition programs throughout their life cycle.					
FY 2021 Plans: N/A					
FY 2022 Base Plans: Fund the Capability Integration acquisition and product support workforce.					
FY 2022 OCO Plans: N/A					
FY 2021 to FY 2022 Increase/Decrease Statement: In FY 2022 PEC 0605831F, Capability Integration, Project 664127, Acq Workforce Direct was transferred to PE 0605831F, Project 665831, Capability Integration.					

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 6	R-1 Program Element (Number/Name) PE 0605831F / Acq Workforce- Capability In tegration	Project (Number/Name) 665831 / Acq Workforce - Capability Integration

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
The FY 2021 civilian pay budget appropriated for Capability Integration in PE 0605831F Project 664127 \$183.841M for 1,405 authorizations at an average work year cost of \$0.138M.					
The FY 2022 PB \$222.985M request in PE 0605831F Project 665831 supports 1,456 authorizations at an average work year cost (AWYC) of \$0.159M.					
The \$39.144M FY 2021 to FY 2022 increase is a result of additional authorizations and increased AWYC.					
Title: Acquisition Workforce - Non-Civilian Pay Description: The acquisition and product support workforce provides cutting edge weapon systems, sustainment capabilities, and is charged with providing management, tools, and technical and business capabilities needed to oversee Capability Integration acquisition programs throughout their life cycle. FY 2021 Plans: N/A FY 2022 Base Plans: Fund the Capability Integration acquisition and product support workforce. FY 2022 OCO Plans: N/A FY 2021 to FY 2022 Increase/Decrease Statement: In FY 2022 PEC 0605831F, Capability Integration, Project 664127, Acq Workforce Direct was transferred to PE 0605831F, Project 665831, Capability Integration.	-	0.000	17.913	0.000	17.913
Accomplishments/Planned Programs Subtotals	-	0.000	240.898	0.000	240.898

C. Other Program Funding Summary (\$ in Millions) N/A
Remarks
D. Acquisition Strategy N/A

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 6: RDT&E Management Support</i>	R-1 Program Element (Number/Name) PE 0605832F / <i>Acq Workforce- Advanced Prgm Technology</i>
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COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
Total Program Element	-	38.517	58.477	103.041	0.000	103.041	-	-	-	-	-	-
664127: <i>Acq Workforce - Direct</i>	-	38.517	58.477	0.000	0.000	0.000	-	-	-	-	-	-
665832: <i>Acq Workfoce- Advanced Prgm Technology</i>	-	0.000	0.000	103.041	0.000	103.041	-	-	-	-	-	-

A. Mission Description and Budget Item Justification

The Air Force Life Cycle Management Center (AFLCMC) equips U.S. and allied forces with operational weapon systems in support of military and national security operations. The acquisition and product support workforce provides cutting edge weapon systems, sustainment capabilities, and is charged with providing management, tools, and technical and business capabilities needed to oversee acquisition programs throughout their life cycle. The direct funded acquisition workforce funded in this program element will support all phases of acquisition programs to include material solution analysis, technology development, engineering and manufacturing development, production and deployment, and operations and support. This funding does not include costs for base operating support civilian personnel.

This program element supports both civilian pay and non-pay support requirements. This program is in Budget Activity 6, RDT&E Management Support because this budget activity includes research, development, test and evaluation efforts and funds to sustain and/or modernize the installations or operations required for general research, development, test and evaluation.

This program is in Budget Activity 6, RDT&E Management Support because this budget activity includes research, development, test and evaluation efforts and funds to sustain and/or modernize the installations or operations required for general research, development, test and evaluation.

B. Program Change Summary (\$ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Previous President's Budget	39.392	40.768	45.541	0.000	45.541
Current President's Budget	38.517	58.477	103.041	0.000	103.041
Total Adjustments	-0.875	17.709	57.500	0.000	57.500
• Congressional General Reductions	0.000	-0.107			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	17.816			
• Reprogrammings	-0.875	0.000			
• SBIR/STTR Transfer	0.000	0.000			
• Other Adjustments	0.000	0.000	57.500	0.000	57.500

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force	Date: May 2021
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Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 6: RDT&E Management Support</i>	R-1 Program Element (Number/Name) PE 0605832F / <i>Acq Workforce- Advanced Prgm Technology</i>
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Change Summary Explanation

In FY 2020, the \$0.875M decrease was due to a \$0.875M Below Threshold Reprogramming. In FY 2021, the \$17.709M increases was due to a \$17.709M Congressional Directed Transfer and a \$0.107M Congressional General Reduction - excess to need.

In FY 2022, funding increase represents a deconsolidation of the previously requested transfer of AFLCMC Acq Workforce PEs into two PEs in the FY 2021 PB.

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 6	R-1 Program Element (Number/Name) PE 0605832F / Acq Workforce- Advanced Prgm Technology	Project (Number/Name) 664127 / Acq Workforce - Direct
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COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
664127: Acq Workforce - Direct	-	38.517	58.477	0.000	0.000	0.000	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-	-	-

A. Mission Description and Budget Item Justification

The Air Force Life Cycle Management Center (AFLCMC) equips U.S. and allied forces with operational weapon systems in support of military and national security operations. The acquisition and product support workforce provides cutting edge weapon systems, sustainment capabilities, and is charged with providing management, tools, and technical and business capabilities needed to oversee acquisition programs throughout their life cycle. The direct funded acquisition workforce funded in this program element will support all phases of acquisition programs to include material solution analysis, technology development, engineering and manufacturing development, production and deployment, and operations and support. This funding does not include costs for base operating support civilian personnel. These program elements support both civilian pay and non-pay support requirements.

B. Accomplishments/Planned Programs (\$ in Millions)

	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Title: Acquisition Workforce - Civilian Pay	38.417	58.377	0.000	0.000	0.000
Description: The acquisition and product support workforce civilian pay provides cutting edge weapon systems, sustainment capabilities, and is charged with providing management, tools, and technical and business capabilities needed to oversee acquisition programs throughout their life cycle.					
FY 2021 Plans: Fund the Advanced Program Technology acquisition and product support workforce.					
FY 2022 Base Plans: N/A					
FY 2022 OCO Plans: N/A					
FY 2021 to FY 2022 Increase/Decrease Statement: In FY 2022 PEC 0605832F, Advanced Program Technology, Project 664127, Acq Workforce Direct was transferred to PE 0605832F, Project 665832, Advanced Program Technology.					
Title: Acquisition Workforce - Non-Civilian Pay	0.100	0.100	0.000	0.000	0.000

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 6	R-1 Program Element (Number/Name) PE 0605832F / <i>Acq Workforce- Advanced Prgm Technology</i>	Project (Number/Name) 664127 / <i>Acq Workforce - Direct</i>

B. Accomplishments/Planned Programs (\$ in Millions)

	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
<p>Description: The acquisition and product support workforce provides cutting edge weapon systems, sustainment capabilities, and is charged with providing management, tools, and technical and business capabilities needed to oversee Advanced Program Technology acquisition programs throughout their life cycle.</p> <p>FY 2021 Plans: Advanced Program Technology acquisition and product support workforce.</p> <p>FY 2022 Base Plans: N/A</p> <p>FY 2022 OCO Plans: N/A</p> <p>FY 2021 to FY 2022 Increase/Decrease Statement: In FY 2022 PEC 0605832F, Advanced Program Technology, Project 664127, Acq Workforce Direct was transferred to PE 0605832F, Project 665832, Advanced Program Technology.</p>					
Accomplishments/Planned Programs Subtotals	38.517	58.477	0.000	0.000	0.000

C. Other Program Funding Summary (\$ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 6					R-1 Program Element (Number/Name) PE 0605832F / Acq Workforce- Advanced Prgm Technology			Project (Number/Name) 665832 / Acq Workfoce-Advanced Prgm Technology				
COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
665832: Acq Workfoce-Advanced Prgm Technology	-	0.000	0.000	103.041	0.000	103.041	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Air Force Life Cycle Management Center (AFLCMC) equips U.S. and allied forces with operational weapon systems in support of military and national security operations. The acquisition and product support workforce provides cutting edge weapon systems, sustainment capabilities, and is charged with providing management, tools, and technical and business capabilities needed to oversee acquisition programs throughout their life cycle. The direct funded acquisition workforce funded in this program element will support all phases of acquisition programs to include material solution analysis, technology development, engineering and manufacturing development, production and deployment, and operations and support. This funding does not include costs for base operating support civilian personnel. These program elements support both civilian pay and non-pay support requirements.

B. Accomplishments/Planned Programs (\$ in Millions)

	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Title: Acquisition Workforce - Civilian Pay	-	0.000	102.941	0.000	102.941
Description: The acquisition and product support workforce civilian pay provides cutting edge weapon systems, sustainment capabilities, and is charged with providing management, tools, and technical and business capabilities needed to oversee Advanced Program Technology acquisition programs throughout their life cycle.					
FY 2021 Plans: N/A					
FY 2022 Base Plans: Fund the Advanced Program Technology acquisition and product support workforce.					
FY 2022 OCO Plans: N/A					
FY 2021 to FY 2022 Increase/Decrease Statement: In FY 2022 PEC 0605832F, Advanced Program Technology, Project 664127, Acq Workforce Direct was transferred to PE 0605832F, Project 665832, Advanced Program Technology.					
The FY 2021 civilian pay budget appropriated for Capability Integration in PE 0605832F Project 664127 \$58.377M for 429 authorizations at an average work year cost of \$0.143M.					

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force	Date: May 2021
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Appropriation/Budget Activity 3600 / 6	R-1 Program Element (Number/Name) PE 0605832F / <i>Acq Workforce- Advanced Prgm Technology</i>	Project (Number/Name) 665832 / <i>Acq Workfoce-Advanced Prgm Technology</i>
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B. Accomplishments/Planned Programs (\$ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
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<p>The FY 2022 PB \$102.941M request in PE 0605831F Project 665831 supports 429 authorizations at an average work year cost (AWYC) of \$0.146M.</p> <p>The \$44.564M FY 2021 to FY 2022 increase is a result of increased AWYC.</p>					
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<p>Title: Acquisition Workforce - Non-Civilian Pay</p> <p>Description: The acquisition and product support workforce provides cutting edge weapon systems, sustainment capabilities, and is charged with providing management, tools, and technical and business capabilities needed to oversee Advanced Program Technology acquisition programs throughout their life cycle.</p> <p>FY 2021 Plans: N/A</p> <p>FY 2022 Base Plans: Fund the Advanced Program Technology acquisition and product support workforce.</p> <p>FY 2022 OCO Plans: N/A</p> <p>FY 2021 to FY 2022 Increase/Decrease Statement: In FY 2022 PEC 0605832F, Advanced Program Technology, Project 664127, Acq Workforce Direct was transferred to PE 0605832F, Project 665832, Advanced Program Technology.</p>	-	0.000	0.100	0.000	0.100
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Accomplishments/Planned Programs Subtotals	-	0.000	103.041	0.000	103.041
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C. Other Program Funding Summary (\$ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 6: RDT&E Management Support</i>	R-1 Program Element (Number/Name) PE 0605833F / <i>Acq Workforce- Nuclear Systems</i>
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COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
Total Program Element	-	135.770	179.318	226.055	0.000	226.055	-	-	-	-	-	-
664127: <i>ACQ Workforce - Direct</i>	-	135.770	179.318	0.000	0.000	0.000	-	-	-	-	-	-
665833: <i>Acq Workforce - Nuclear Systems</i>	-	0.000	0.000	226.055	0.000	226.055	-	-	-	-	-	-

Note
 In FY 2022, PE 0605833F, Acquisition Workforce - Nuclear Systems, Project 664127, (ACQ Workforce - Direct) efforts were transferred to Project 665833 (Acq Workforce - Nuclear Systems) in order to better provide transparency to congress on acquisition workforce execution.

A. Mission Description and Budget Item Justification

This program element directly funds the Air Force Nuclear Weapons Center (AFNWC) and Air Force Life Cycle Management Center (AFLCMC) nuclear acquisition workforce.

AFNWC and AFLCMC equip U.S. forces with operational nuclear weapon systems in support of military and national security operations. The acquisition and product support workforce provides cutting edge weapon systems, sustainment capabilities, and is charged with providing management, tools, technical and business capabilities needed to oversee Nuclear Systems acquisition programs throughout their life cycle. The direct funded acquisition workforce funded in this program element will support all phases of acquisition programs to include material solution analysis, technology development, engineering and manufacturing development, production and deployment, and operations and support. This funding does not include costs for base operating support civilian personnel. These program elements support both civilian pay and non-pay support requirements.

This program is in Budget Activity 6, RDT&E Management Support because this budget activity includes research, development, test and evaluation efforts and funds to sustain and/or modernize the installations or operations required for general research, development, test and evaluation.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force	Date: May 2021
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Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force</i> / BA 6: <i>RDT&E Management Support</i>	R-1 Program Element (Number/Name) PE 0605833F / <i>Acq Workforce- Nuclear Systems</i>
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B. Program Change Summary (\$ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Previous President's Budget	133.231	179.646	223.588	0.000	223.588
Current President's Budget	135.770	179.318	226.055	0.000	226.055
Total Adjustments	2.539	-0.328	2.467	0.000	2.467
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	-0.328			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	2.539	0.000			
• SBIR/STTR Transfer	0.000	0.000			
• Other Adjustments	0.000	0.000	2.467	0.000	2.467

Change Summary Explanation

In FY20 \$2.539M Below Threshold Reprogramming actions taken to cover the increased expenditures in civilian pay due to the moving of 78 DCA personnel into 0605833F.

The FY22 PB provides 1385 authorizations. The FY22 budgeted Average Work Year Cost (AWYC) is \$.153M The 46.737M FY21 (FY (CY) PB) to 22 (FY (BY) PB) increase is due to 121 more authorizations (17.801M), a budgeted AWYC increase (21.593M), and a non-civilian pay upward adjustment of (0.001M). The increase of 180 authorizations in this program element is due to Nuclear Enterprise recapitalization and sustainment efforts across the FYDP. The budgeted AWYC increased (3K) per authorization due to the recruitment and retention efforts in order to hire and retain a qualified workforce.

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 6	R-1 Program Element (Number/Name) PE 0605833F / Acq Workforce- Nuclear Sys tems	Project (Number/Name) 664127 / ACQ Workforce - Direct
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COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
664127: ACQ Workforce - Direct	-	135.770	179.318	0.000	0.000	0.000	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-	-	-

A. Mission Description and Budget Item Justification

This program element directly funds the Air Force Nuclear Weapons Center (AFNWC) and Air Force Life Cycle Management Center (AFLCMC) nuclear acquisition workforce.

AFNWC and AFLCMC equip U.S. forces with operational nuclear weapon systems in support of military and national security operations. The acquisition and product support workforce provides cutting edge weapon systems, sustainment capabilities, and is charged with providing management, tools, technical and business capabilities needed to oversee Nuclear Systems acquisition programs throughout their life cycle. The direct funded acquisition workforce funded in this program element will support all phases of acquisition programs to include material solution analysis, technology development, engineering and manufacturing development, production and deployment, and operations and support. This funding does not include costs for base operating support civilian personnel. These program elements support both civilian pay and non-pay support requirements.

B. Accomplishments/Planned Programs (\$ in Millions)

	FY 2020	FY 2021	FY 2022
Title: Acquisition Workforce	135.770	173.318	0.000
Description: The acquisition and product support workforce provides cutting edge weapon systems, sustainment capabilities, and is charged with providing management, tools, and technical and business capabilities needed to oversee Nuclear Systems acquisition programs throughout their life cycle.			
FY 2021 Plans: Fund the Nuclear Systems acquisition and product support workforce.			
FY 2022 Plans: N/A			
FY 2021 to FY 2022 Increase/Decrease Statement: In FY 2022, PE 0605833F, Acquisition Workforce - Nuclear Systems, Project 664127, (ACQ Workforce - Direct) efforts were transferred to Project 665833 (Acq Workforce - Nuclear Systems) in order to better provide transparency to congress on acquisition workforce execution.			
Title: AFNWC Headquarters (HQ) Management Support	0.000	6.000	0.000

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force		Date: May 2021		
Appropriation/Budget Activity 3600 / 6	R-1 Program Element (Number/Name) PE 0605833F / <i>Acq Workforce- Nuclear Sys tems</i>	Project (Number/Name) 664127 / <i>ACQ Workforce - Direct</i>		
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2020	FY 2021	FY 2022
<p>Description: Provides resources for non-pay AFNWC HQ Management Support providing continuous cutting edge nuclear weapon systems, sustainment capabilities, management, tools, and technical and business capabilities needed to oversee Nuclear Weapons acquisition programs throughout their life cycle.</p> <p>FY 2021 Plans: Day-to-day operations support for AFNWC HQ Staff such as IT support, A&AS contract support, travel, supplies, temporary duty travel, operations and material support contract costs for nuclear system engineering and maintenance.</p> <p>FY 2022 Plans: N/A</p> <p>FY 2021 to FY 2022 Increase/Decrease Statement: In FY 2022, PE 0605833F, Acquisition Workforce - Nuclear Systems, Project 664127, (ACQ Workforce - Direct) efforts were transferred to Project 665833 (Acq Workforce - Nuclear Systems) in order to better provide transparency to congress on acquisition workforce execution.</p>				
Accomplishments/Planned Programs Subtotals		135.770	179.318	0.000
C. Other Program Funding Summary (\$ in Millions)				
N/A				
Remarks				
FY21-25: \$80.962M increase due to 1) Transfer of NC3 personnel into PE 0605833F and 2) AFNWC Management Headquarters Support funds transitioning from 3400 O&M to 3600 RDT&E beginning FY21.				
D. Acquisition Strategy				
N/A				

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force										Date: May 2021		
Appropriation/Budget Activity 3600 / 6					R-1 Program Element (Number/Name) PE 0605833F / Acq Workforce- Nuclear Sys tems				Project (Number/Name) 665833 / Acq Workforce - Nuclear Systems			
COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
665833: Acq Workforce - Nuclear Systems	-	0.000	0.000	226.055	0.000	226.055	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

In FY 2022, PE 0605833F, Acquisition Workforce - Nuclear Systems, Project 664127, (ACQ Workforce - Direct) efforts were transferred to Project 665833 (Acq Workforce - Nuclear Systems) in order to better provide transparency to congress on acquisition workforce execution.

A. Mission Description and Budget Item Justification

This program element directly funds the Air Force Nuclear Weapons Center (AFNWC) and Air Force Life Cycle Management Center (AFLCMC) nuclear acquisition workforce.

AFNWC and AFLCMC equip U.S. forces with operational nuclear weapon systems in support of military and national security operations. The acquisition and product support workforce provides cutting edge weapon systems, sustainment capabilities, and is charged with providing management, tools, technical and business capabilities needed to oversee Nuclear Systems acquisition programs throughout their life cycle. The direct funded acquisition workforce funded in this program element will support all phases of acquisition programs to include material solution analysis, technology development, engineering and manufacturing development, production and deployment, and operations and support. This funding does not include costs for base operating support civilian personnel. These program elements support both civilian pay and non-pay support requirements.

B. Accomplishments/Planned Programs (\$ in Millions)

	FY 2020	FY 2021	FY 2022
Title: AFNWC Headquarters (HQ) Management Support	-	-	219.955
Description: The acquisition and product support workforce provides cutting edge weapon systems, sustainment capabilities, and is charged with providing management, tools, and technical and business capabilities needed to oversee Nuclear Systems acquisition programs throughout their life cycle.			
FY 2022 Plans: In FY 2022, PE 0605833F, Acquisition Workforce - Nuclear Systems, Project 664127, (ACQ Workforce - Direct) efforts were transferred to Project 665833 (Acq Workforce - Nuclear Systems) in order to better provide transparency to congress on acquisition workforce execution.			
Fund the Nuclear Systems acquisition and product support workforce.			
FY 2021 to FY 2022 Increase/Decrease Statement:			

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 6	R-1 Program Element (Number/Name) PE 0605833F / <i>Acq Workforce- Nuclear Sys tems</i>	Project (Number/Name) 665833 / <i>Acq Workforce - Nuclear Systems</i>

B. Accomplishments/Planned Programs (\$ in Millions)

	FY 2020	FY 2021	FY 2022
<p>The FY22 PB provides 1,447 authorizations. The FY22 budgeted Average Work Year Cost (AWYC) is \$.153. The 30.034MFY21 (FY (CY) PB) to 22 (FY (BY) PB) increase is due to 180 more authorizations (17.801M), a budgeted AWYC increase(21.593M), and a non-civilian pay upward adjustment of (0.001M). The increase of 121 authorizations in this program element is due to Nuclear Enterprise recapitalization and sustainment efforts across the FYDP. The budgeted AWYC increased (3K) per authorization due to the recruitment and retention efforts in order to hire and retain a qualified workforce.</p> <p>Title: Acquisition Workforce</p> <p>Description: Provides resources for non-pay AFNWC HQ Management Support providing continuous cutting edge nuclear weapon systems, sustainment capabilities, management, tools, and technical and business capabilities needed to over see Nuclear Weapons acquisition programs throughout their life cycle.</p> <p>FY 2022 Plans: In FY 2022, PE 0605833F, Acquisition Workforce - Nuclear Systems, Project 664127, (ACQ Workforce - Direct) efforts were transferred to Project 665833 (Acq Workforce - Nuclear Systems) in order to better provide transparency to congress on acquisition workforce execution.</p> <p>Day-to-day operations support for AFNWC HQ Staff such as IT support, A&AS contract support, travel, supplies, temporary duty travel, operations and material support contract costs for nuclear system engineering and maintenance.</p> <p>FY 2021 to FY 2022 Increase/Decrease Statement: Funding increase due to expected inflation of goods and services purchased by staff directorates as well as increase in requirements to support growing workforce.</p>	-	-	6.100
Accomplishments/Planned Programs Subtotals	-	-	226.055

C. Other Program Funding Summary (\$ in Millions)

N/A

Remarks
FY21-25:AFNWC Management Headquarters Support funds transitioning from 3400 O&M to 3600 RDT&E beginning FY21.

D. Acquisition Strategy

N/A

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 6: RDT&E Management Support</i>	R-1 Program Element (Number/Name) PE 0605898F / <i>Management HQ - R&D</i>
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COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
Total Program Element	-	5.932	5.724	4.079	0.000	4.079	-	-	-	-	-	-
664127: <i>ACQ Workforce - Direct</i>	-	5.932	5.724	0.000	0.000	0.000	-	-	-	-	-	-
665898: <i>Management HQ-R&D</i>	-	0.000	0.000	4.079	0.000	4.079	-	-	-	-	-	-

A. Mission Description and Budget Item Justification

The Management Headquarters program element 0605898F includes management headquarters personnel for Air Force Life Cycle Management Center.

The Air Force Life Cycle Management Center (AFLCMC) equips U.S. and allied forces with operational weapon systems in support of military and national security operations. The acquisition and product support workforce provides cutting edge weapon systems, sustainment capabilities, and is charged with providing management, tools, and technical and business capabilities needed to oversee acquisition programs throughout their life cycle. The direct funded acquisition workforce funded in this program element will support all phases of acquisition programs to include material solution analysis, technology development, engineering and manufacturing development, production and deployment, and operations and support. This funding does not include costs for base operating support civilian personnel. This program element supports both civilian pay and non-pay support requirements.

This program is in Budget Activity 6, RDT&E Management Support because this budget activity includes research, development, test and evaluation efforts and funds to sustain and/or modernize the installations or operations required for general research, development, test and evaluation.

B. Program Change Summary (\$ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Previous President's Budget	5.590	5.734	3.896	0.000	3.896
Current President's Budget	5.932	5.724	4.079	0.000	4.079
Total Adjustments	0.342	-0.010	0.183	0.000	0.183
• Congressional General Reductions	0.000	-0.010			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.342	0.000			
• SBIR/STTR Transfer	0.000	0.000			
• Other Adjustments	0.000	0.000	0.183	0.000	0.183

Change Summary Explanation

In FY 2020, the \$0.342M increase was due to an approved \$0.150M Above Threshold Reprogramming and a \$0.192M Below Threshold Reprogramming. In FY 2021, the \$0.010M decrease due to a \$0.10M Congressional General Reduction - excess to need.

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force										Date: May 2021		
Appropriation/Budget Activity 3600 / 6					R-1 Program Element (Number/Name) PE 0605898F / Management HQ - R&D				Project (Number/Name) 664127 / ACQ Workforce - Direct			
COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
664127: ACQ Workforce - Direct	-	5.932	5.724	0.000	0.000	0.000	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Management Headquarters program element 0605898F includes management headquarters personnel for Air Force Life Cycle management Center.

The Air Force Life Cycle Management Center (AFLCMC) equips U.S. and allied forces with operational weapon systems in support of military and national security operations. The acquisition and product support workforce provides cutting edge weapon systems, sustainment capabilities, and is charged with providing management, tools, and technical and business capabilities needed to oversee acquisition programs throughout their life cycle. The direct funded acquisition workforce funded in this program element will support all phases of acquisition programs to include material solution analysis, technology development, engineering and manufacturing development, production and deployment, and operations and support. This funding does not include costs for base operating support civilian personnel. This program element supports both civilian pay and non-pay support requirements.

B. Accomplishments/Planned Programs (\$ in Millions)

	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Title: Acquisition Workforce - Civilian Pay	5.832	5.624	0.000	0.000	0.000
Description: Life Cycle Management Center management headquarters civilian pay.					
FY 2021 Plans: Fund Life Cycle Management Center management headquarters personnel.					
FY 2022 Base Plans: N/A					
FY 2022 OCO Plans: N/A					
FY 2021 to FY 2022 Increase/Decrease Statement: In FY 2022 PEC 0605898F, Management HQ, Project 664127, Acq Workforce Direct was transferred to PE 0605898F, Project 665898, Management HQ.					
Title: Acquisition Workforce - Non-Civilian Pay	0.100	0.100	0.000	0.000	0.000
Description: Life Cycle Management Center management headquarters non-civilian pay.					
FY 2021 Plans:					

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force	Date: May 2021
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Appropriation/Budget Activity 3600 / 6	R-1 Program Element (Number/Name) PE 0605898F / Management HQ - R&D	Project (Number/Name) 664127 / ACQ Workforce - Direct
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B. Accomplishments/Planned Programs (\$ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Fund Life Cycle Management Center management headquarters personnel					
<i>FY 2022 Base Plans:</i> N/A					
<i>FY 2022 OCO Plans:</i> N/A					
<i>FY 2021 to FY 2022 Increase/Decrease Statement:</i> In FY 2022 PEC 0605898F, Management HQ, Project 664127, Acq Workforce Direct was transferred to PE 0605898F, Project 665898, Management HQ.					
Accomplishments/Planned Programs Subtotals	5.932	5.724	0.000	0.000	0.000

C. Other Program Funding Summary (\$ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force										Date: May 2021		
Appropriation/Budget Activity 3600 / 6					R-1 Program Element (Number/Name) PE 0605898F / Management HQ - R&D				Project (Number/Name) 665898 / Management HQ-R&D			
COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
665898: Management HQ-R&D	-	0.000	0.000	4.079	0.000	4.079	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Management Headquarters program element 0605898F includes management headquarters personnel for Air Force Life Cycle management Center.

The Air Force Life Cycle Management Center (AFLCMC) equips U.S. and allied forces with operational weapon systems in support of military and national security operations. The acquisition and product support workforce provides cutting edge weapon systems, sustainment capabilities, and is charged with providing management, tools, and technical and business capabilities needed to oversee acquisition programs throughout their life cycle. The direct funded acquisition workforce funded in this program element will support all phases of acquisition programs to include material solution analysis, technology development, engineering and manufacturing development, production and deployment, and operations and support. This funding does not include costs for base operating support civilian personnel. This program element supports both civilian pay and non-pay support requirements.

B. Accomplishments/Planned Programs (\$ in Millions)

	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Title: Acquisition Workforce - Civilian Pay	-	0.000	3.979	0.000	3.979
Description: Life Cycle Management Center management headquarters civilian pay.					
FY 2021 Plans: N/A					
FY 2022 Base Plans: Fund Life Cycle Management Center management headquarters personnel					
FY 2022 OCO Plans: N/A					
FY 2021 to FY 2022 Increase/Decrease Statement: The FY 2021 civilian pay budget appropriated for Management HQ in PE 0605898F Project 664127 \$5.624M for 38 authorizations at an average work year cost (AWYC) of \$0.141M. The FY 2022 PB \$3.979M request in PE 0605898F Project 665898 supports 38 authorizations at an AWYC of \$0.143M					

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force	Date: May 2021
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Appropriation/Budget Activity 3600 / 6	R-1 Program Element (Number/Name) PE 0605898F / Management HQ - R&D	Project (Number/Name) 665898 / Management HQ-R&D
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B. Accomplishments/Planned Programs (\$ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
The \$1.645M FY 2021 to FY 2022 decrease is a result of decreased AWYC.					
Title: Acquisition Workforce - Non-Civilian Pay	-	0.000	0.100	0.000	0.100
Description: Life Cycle Management Center management headquarters non-civilian pay.					
FY 2021 Plans: N/A					
FY 2022 Base Plans: Fund Life Cycle Management Center management headquarters personnel					
FY 2022 OCO Plans: N/A					
FY 2021 to FY 2022 Increase/Decrease Statement: In FY 2022 PEC 0605898F, Management HQ, Project 664127, Acq Workforce Direct was transferred to PE 0605898F, Project 665898, Management HQ.					
Accomplishments/Planned Programs Subtotals	-	0.000	4.079	0.000	4.079

C. Other Program Funding Summary (\$ in Millions)
N/A

Remarks

D. Acquisition Strategy
N/A

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 6: RDT&E Management Support</i>	R-1 Program Element (Number/Name) PE 0605976F / <i>Facilities Restoration and Modernization - Test and Evaluation Support</i>
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COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
Total Program Element	-	88.445	70.856	70.788	0.000	70.788	-	-	-	-	-	-
6606MC: <i>Facility Restoration and Modernization - T&E</i>	-	88.445	70.856	70.788	0.000	70.788	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Restoration includes repair and replacement work to restore damaged facilities due to accident or failure attributable to inadequate sustainment, excessive age, or other causes. Modernization includes alteration of facilities to implement a new, higher standard (including regulatory changes), to accommodate new functions, or to replace building components that typically last more than 50 years (such as foundations and structural components). Other tasks associated with facilities operations (such as custodial services, grass cutting, and the provision of central utilities) are not included. These restoration/modernization funds support the following Air Force test organizations and their associated test and evaluation facilities, including: remote locations, the 96th Test Wing (TW) at Eglin AFB, FL, Arnold Engineering and Development Complex (AEDC) at Arnold AFB, TN, including AEDC's 704th Test Group (TG) at Holloman AFB, NM, 704 TG Landing Gear Test Facility (LGTF) at Wright-Patterson AFB, OH, AEDC's Hypersonic Wind Tunnel 9 at White Oak, MD, AEDC's National Full-Scale Aerodynamics Complex (NFAC) at Moffett Field, CA, AEDC's McKinley Climatic Lab (MCL) at Eglin AFB, FL, and the 412th TW at Edwards AFB, CA.

This program is in Budget Activity 6, RDT&E Management Support because this budget activity includes research, development, test and evaluation efforts and funds to sustain and/or modernize the installations or operations required for general research, development, test and evaluation.

B. Program Change Summary (\$ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Previous President's Budget	88.445	70.985	70.622	0.000	70.622
Current President's Budget	88.445	70.856	70.788	0.000	70.788
Total Adjustments	0.000	-0.129	0.166	0.000	0.166
• Congressional General Reductions	0.000	-0.129			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	0.000	0.000			
• Other Adjustments	0.000	0.000	0.166	0.000	0.166

Change Summary Explanation

N/A

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force		Date: May 2021		
Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 6: RDT&E Management Support</i>		R-1 Program Element (Number/Name) PE 0605976F / <i>Facilities Restoration and Modernization - Test and Evaluation Support</i>		
C. Accomplishments/Planned Programs (\$ in Millions)		FY 2020	FY 2021	FY 2022
<p>Title: Facility restoration and modernization at the 96 TW</p> <p>Description: Facility restoration and modernization at the 96th TW.</p> <p>FY 2021 Plans: Continue Restoration and Modernization (R&M) efforts across the range complex including Heating, Ventilation and Air Conditioning (HVAC) systems, repair/replace lightning protection systems, repair/replace fire protection systems and corrosion control. Includes \$1.8 million provided to assist with natural disaster recovery efforts associated with Hurricane Michael.</p> <p>FY 2022 Plans: Continue Restoration and Modernization (R&M) efforts across the range complex including Heating, Ventilation and Air Conditioning (HVAC) systems, repair/replace lightning protection systems, repair/replace fire protection systems and corrosion control.</p> <p>FY 2021 to FY 2022 Increase/Decrease Statement: FY22 increase of \$1 million is a result of FSRM Baseline respread.</p>		3.375	6.673	7.686
<p>Title: Facility restoration and modernization at AEDC</p> <p>Description: Facility restoration and modernization at AEDC.</p> <p>FY 2021 Plans: Complete execution of the three remaining AEDC SLEPs to restore and modernize the Propulsion Wind Tunnel (PWT), Von Karmen Facility (VKF), & Engine Test Facility (ETF) infrastructure. Continue construction/installation of FY21 SLEP efforts using Facilities Acquisitions for Restoration and Modernization (FARM) and other contracts. Continue to perform second and third level maintenance to restore ground test facilities to operational status. Complete restoration of the J-5 Exhaust system. Continue refurbish of VKF valves to ensure continued operation of Tunnels A, B, & C. AEDC will fund the Landing Gear Test Facility (LGTF) Control System Modernization for the 84" and 120" dynamotor and the Tire Force Machine (TFM); the National Radar Cross Section (RCS) Test Facility (NRTF) Fire Protection Reservoir Liner; and Replace the HVAC for the Central Inertial GPS Test Facility (CIGTF) machine shop and industrial complex.</p> <p>FY 2022 Plans: With the completion of the FY17 SLEP projects, AEDC resumes a baseline posture of addressing facility restoration and modernization across the wing such as repair and replacement of aging electrical and plumbing systems critical to test execution and installation and improvement of safety features such as fire suppression and warning systems. The increase of \$1.3M from FY21 to FY22 is due to a \$6.4 million hypersonic infrastructure modernization investment.</p> <p>FY 2021 to FY 2022 Increase/Decrease Statement:</p>		79.771	58.607	54.578

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force	Date: May 2021
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Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 6: RDT&E Management Support</i>	R-1 Program Element (Number/Name) PE 0605976F / <i>Facilities Restoration and Modernization - Test and Evaluation Support</i>
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C. Accomplishments/Planned Programs (\$ in Millions)	FY 2020	FY 2021	FY 2022
FY22 decrease of \$4 million is a result of FSRM Baseline respread.			
Title: Facility restoration and modernization at 412 TW	5.299	5.576	8.524
Description: Facility restoration and modernization at the 412 TW.			
FY 2021 Plans: Continuation of the upgrade and restoration of T&E facilities, such as but not limited to, Hydraulic Unit Upgrade B1030; Power Supply for System Under Test Power B1030; modernize electrical system components that have reached end of service life B1020; remediate B1830 fire safety deficiencies; and Seismic upgrade.			
FY 2022 Plans: Continuation of the upgrade and restoration of T&E facilities. Areas of effort include repair and modernization of electrical system components, address fire safety deficiencies, continue Seismic upgrades, and address other restoration and modernization needs throughout the test wing.			
FY 2021 to FY 2022 Increase/Decrease Statement: FY22 increase of \$3 million is a result of FSRM Baseline respread.			
Accomplishments/Planned Programs Subtotals	88.445	70.856	70.788

D. Other Program Funding Summary (\$ in Millions)											
<u>Line Item</u>	<u>FY 2020</u>	<u>FY 2021</u>	<u>FY 2022</u> <u>Base</u>	<u>FY 2022</u> <u>OCO</u>	<u>FY 2022</u> <u>Total</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>FY 2026</u>	<u>Cost To Complete</u>	<u>Total Cost</u>
• RDTE 06 PE 0604256F: <i>Threat Simulator Development</i>	58.906	57.620	41.909	-	41.909	-	-	-	-	-	-
• RDTE 06 PE 0604759F: <i>Major T&E Investment</i>	106.014	208.299	130.766	-	130.766	-	-	-	-	-	-
• RDTE 06 PE 0605807F: <i>Test and Evaluation Support</i>	795.626	761.307	811.032	-	811.032	-	-	-	-	-	-
• RDTE 06 PE 0605978F: <i>Facility Sustainment - T&E Support</i>	29.424	29.826	30.057	-	30.057	-	-	-	-	-	-

Remarks

E. Acquisition Strategy
N/A.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 6: RDT&E Management Support</i>	R-1 Program Element (Number/Name) PE 0605978F / <i>Facilities Sustainment - Test and Evaluation Support</i>
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COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
Total Program Element	-	29.424	29.826	30.057	0.000	30.057	-	-	-	-	-	-
6606MR: <i>Facility Sustainment-T&E Support</i>	-	29.424	29.826	30.057	0.000	30.057	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-	-	-

A. Mission Description and Budget Item Justification

Provides resources for sustainment activities required for an inventory of Air Force Material Command (AFMC) Test and Evaluation (T&E) facilities. Facility sustainment includes regularly scheduled adjustments and inspections, preventative maintenance tasks, and emergency response and service calls for minor repairs. It also includes major repairs or replacement of facility components that have exceeded their useful life. In addition to standard facility sustainment, such as roof replacement, refinishing of wall and floor surfaces, and repairing and replacing of heating and cooling systems, funding in this program element allows for inspections and repairs of heavy plant machinery. Examples of the maintenance work performed are inspection and repair of high-power electrical switching gear, hydraulic, lubrication, forced-air and fluid cooling systems, high pressure vessel health monitoring, facility control and remote monitoring systems, liquid oxygen systems, steam systems, test instrumentation, and fire detection and suppression systems. Other tasks associated with facilities operations (such as custodial services, grass cutting, and landscaping, waste disposal, and the provision of central utilities) are not included. These sustainment funds support the following Air Force organizations and their associated test and evaluation facilities, including: remote locations, the 96th Test Wing (TW) at Eglin AFB, FL, Arnold Engineering and Development Complex (AEDC) at Arnold AFB, TN, AEDC's 704th Test Group (TG) at Holloman AFB, NM, AEDC's 704 TG Landing Gear Test Facility (LGTf) at Wright-Patterson AFB, OH, AEDC's Hypersonic Wind Tunnel 9 at White Oak, MD, AEDC's National Full-Scale Aerodynamics Complex (NFAC) at Moffett Field, CA, AEDC's McKinley Climatic Laboratory (MCL) at Eglin AFB, FL and the 412 Test Wing (TW) at Edwards AFB, CA.

This program is in Budget Activity 6, RDT&E Management Support because this budget activity includes research, development, test and evaluation efforts and funds to sustain and/or modernize the installations or operations required for general research, development, test and evaluation.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force	Date: May 2021
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Appropriation/Budget Activity 3600: Research, Development, Test & Evaluation, Air Force I BA 6: RDT&E Management Support	R-1 Program Element (Number/Name) PE 0605978F I Facilities Sustainment - Test and Evaluation Support
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B. Program Change Summary (\$ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Previous President's Budget	29.424	29.880	30.509	0.000	30.509
Current President's Budget	29.424	29.826	30.057	0.000	30.057
Total Adjustments	0.000	-0.054	-0.452	0.000	-0.452
• Congressional General Reductions	0.000	-0.054			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	0.000	0.000			
• Other Adjustments	0.000	0.000	-0.452	0.000	-0.452

Change Summary Explanation

Not applicable

C. Accomplishments/Planned Programs (\$ in Millions)	FY 2020	FY 2021	FY 2022
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Title: Facility sustainment at the 96 TW.	0.983	1.005	1.011
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Description: Facility sustainment at the 96 TW.

FY 2021 Plans:

Continue to work through Direct Scheduled Work Orders (DSWs) within the test infrastructure.

FY 2022 Plans:

Continue to work through Direct Scheduled Work Orders (DSWs) within the test infrastructure.

FY 2021 to FY 2022 Increase/Decrease Statement:

Baseline increase in restoration and modernization repair and research and development contracts.

Title: Facility sustainment at the AEDC.	25.782	26.119	26.328
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Description: Facility sustainment at the AEDC.

FY 2021 Plans:

Continue to perform calendar based scheduled preventative maintenance on Engine Test Facility Plant and associated engine test cells, Propulsion Wind Tunnel Plant and associated wind tunnels, Von Karman Facility (VKF) Plant Core and associated test cells, arc heaters, rocket test facility, space chambers, and hypersonic engine test facilities, along with associated infrastructure

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force	Date: May 2021
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Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 6: RDT&E Management Support</i>	R-1 Program Element (Number/Name) PE 0605978F / <i>Facilities Sustainment - Test and Evaluation Support</i>
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C. Accomplishments/Planned Programs (\$ in Millions)	FY 2020	FY 2021	FY 2022
that supports all test operations. Sustainment project includes painting buildings, carpet replacement, heating, ventilation, air conditioning (HVAC) repairs and roof repairs throughout the 704 TG.			
FY 2022 Plans: Continue to perform calendar based scheduled preventative maintenance on Engine Test Facility Plant and associated engine test cells, Propulsion Wind Tunnel Plant and associated wind tunnels, Von Karman Facility (VKF) Plant Core and associated test cells, arc heaters, rocket test facility, space chambers, and hypersonic engine test facilities, along with associated infrastructure that supports all test operations. Sustainment project includes painting buildings, carpet replacement, heating, ventilation, air conditioning (HVAC) repairs and roof repairs throughout the 704 TG.			
FY 2021 to FY 2022 Increase/Decrease Statement: Baseline increase in restoration and modernization repair and research and development contracts.			
Title: Facility sustainment at the 412 TW.	2.659	2.702	2.718
Description: Facility sustainment at the 412 TW.			
FY 2021 Plans: Continue sustainment of test unique infrastructure in 412 TW Electronic Warfare, Range, and other T&E facilities located at Edwards AFB, CA.			
FY 2022 Plans: Continue sustainment of test unique infrastructure in 412 TW Electronic Warfare, Range, and other T&E facilities located at Edwards AFB, CA.			
FY 2021 to FY 2022 Increase/Decrease Statement: Baseline increase in restoration and modernization repair and research and development contracts.			
Accomplishments/Planned Programs Subtotals	29.424	29.826	30.057

D. Other Program Funding Summary (\$ in Millions)											
<u>Line Item</u>	<u>FY 2020</u>	<u>FY 2021</u>	<u>FY 2022</u>	<u>FY 2022</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>FY 2026</u>	<u>Cost To</u>	<u>Total Cost</u>
			<u>Base</u>	<u>OCO</u>	<u>Total</u>					<u>Complete</u>	
• RDTE 06 PE 0604256F: <i>Threat Simulator Development</i>	58.906	57.620	41.909	-	41.909	-	-	-	-	-	-
• RDTE 06 PE 0604759F: <i>Major T&E Investment</i>	106.014	208.299	130.766	-	130.766	-	-	-	-	-	-

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force	Date: May 2021
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Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 6: RDT&E Management Support</i>	R-1 Program Element (Number/Name) PE 0605978F / <i>Facilities Sustainment - Test and Evaluation Support</i>
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D. Other Program Funding Summary (\$ in Millions)

<u>Line Item</u>	<u>FY 2020</u>	<u>FY 2021</u>	<u>FY 2022</u> <u>Base</u>	<u>FY 2022</u> <u>OCO</u>	<u>FY 2022</u> <u>Total</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>FY 2026</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• RDTE 06 PE 0605807F: <i>Test & Evaluation Support</i>	795.626	761.307	811.032	-	811.032	-	-	-	-	-	-
• RDTE 06 PE 0605976F: <i>Facility Restoration and Modernization-T&E</i>	88.445	70.856	70.788	-	70.788	-	-	-	-	-	-

Remarks

E. Acquisition Strategy

N/A

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 6: RDT&E Management Support</i>	R-1 Program Element (Number/Name) PE 0606017F / <i>Requirements Analysis and Maturation</i>
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COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
Total Program Element	-	81.734	68.256	85.799	0.000	85.799	-	-	-	-	-	-
666157: <i>Development Planning</i>	-	35.533	12.049	12.804	0.000	12.804	-	-	-	-	-	-
666158: <i>INTEGRATED SIMULATION AND ANALYSIS</i>	-	46.201	56.207	72.995	0.000	72.995	-	-	-	-	-	-

Note

This program, BA 6, PE 0606017F, project 666158, Common Synthetic Training Environment, is a new start.

A. Mission Description and Budget Item Justification

The Requirements Analysis and Maturation (RAM) program funds development planning (DP) to include early systems engineering and integrated simulation and analysis. These activities include requirements analysis, capability decomposition and trade space characterization, concept development (joint and cross-Service, family of systems, system of systems, air, space, and cyber) and architecture design, cost analysis, modeling and simulation of representative or prototype systems, model validation, analytical tool development, and focused capability risk reduction. Outcomes of development planning activities include: technologically informed requirements; mature concepts that are technically feasible, operationally relevant, and militarily useful; and recommendations for science and technology (S&T) investment to reduce technical risks. Development planning activities provide the Doctrine, Organization, Training, Materiel, Leadership and Education, Personnel, Facilities, and Policy (DOTMLPF-P) analytic basis for cost and capability trades driving non-materiel and/or materiel solutions. Early-phase systems engineering and technical planning activities funded by this program provide the foundation for informed investment decisions leading to successful acquisition programs. Development planning efforts arise from engagements with industry and academia, from intersections of technology improvements with Air Force missions, from emerging operational requirements, and from vetted future-fight concepts.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver Requirements Analysis and Maturation capability. The use of such programs funds would be in addition to the civilian pay expenses budgeted in program element 0605831F.

In FY20 \$0.256 million was expended and in FY21 \$0.996 million is estimated to be expended for civilian pay expenses in this program element.

This program is in Budget Activity 6, RDT&E Management Support because this budget activity includes research, development, test and evaluation efforts and funds to sustain and/or modernize the installations or operations required for general research, development, test and evaluation.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 6: RDT&E Management Support</i>	R-1 Program Element (Number/Name) PE 0606017F / <i>Requirements Analysis and Maturation</i>
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B. Program Change Summary (\$ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Previous President's Budget	86.715	63.381	58.847	0.000	58.847
Current President's Budget	81.734	68.256	85.799	0.000	85.799
Total Adjustments	-4.981	4.875	26.952	0.000	26.952
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	5.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	-2.781	0.000			
• Other Adjustments	-2.200	-0.125	26.952	0.000	26.952

Congressional Add Details (\$ in Millions, and Includes General Reductions)

Project: 666157: *Development Planning*

Congressional Add: *Program Increase - Nuclear Modernization Analytics*

Congressional Add: *Program Increase - Nuclear Deterrence Research*

Congressional Add: *Unfunded Requirement - Development Planning*

Congressional Add Subtotals for Project: 666157

Project: 666158: *INTEGRATED SIMULATION AND ANALYSIS*

Congressional Add: *Unfunded Requirement - Integrated Simulation and Analysis*

Congressional Add: *Program Increase - Nuclear Modernization Analytics*

Congressional Add Subtotals for Project: 666158

Congressional Add Totals for all Projects

	FY 2020	FY 2021
	7.713	0.000
	9.641	-
	1.928	-
	19.282	0.000
	3.857	-
	-	5.000
	3.857	5.000
	23.139	5.000

Change Summary Explanation

FY 2022 funding increased compared to FY 2021 by \$26.952 million. Funding increased due to the addition of Common Synthetic Training Environment effort.

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600 / 6	R-1 Program Element (Number/Name) PE 0606017F / <i>Requirements Analysis and Maturation</i>	Project (Number/Name) 666157 / <i>Development Planning</i>
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COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
666157: <i>Development Planning</i>	-	35.533	12.049	12.804	0.000	12.804	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-	-	-

A. Mission Description and Budget Item Justification

The Development Planning (DP) project funds activities that analyze Air Force capability needs and requirements to identify potential shortfalls and opportunities; formulate candidate concepts and solution options addressing identified capability needs and shortfalls; obtain specific evidence to confirm and refute capability bounds; and conduct coordinated early systems engineering to derive key capability trades, technology needs, and cost and schedule implications. Emphasis is placed on activities informing strategic planning and operational experimentation, analyzing multi-domain capabilities that look first at non-materiel solutions before generating materiel needs and requirements.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver Requirements Analysis and Maturation capability. The use of such programs funds would be in addition to the civilian pay expenses budgeted in program element 0605831F.

In FY 2019 \$0.000 million and in FY 2020 \$0.000 million was expended for civilian pay expenses in this project.

B. Accomplishments/Planned Programs (\$ in Millions)

	FY 2020	FY 2021	FY 2022
Title: Future Capability Analyses	5.123	4.173	5.144
Description: Conduct capability analyses that decompose long-term warfighter capability goals and requirements into pertinent materiel and non-materiel elements. Identify opportunities and potential shortfalls between planned investments and long-term capability needs. Engage technology base and test communities to inform capability employment and constraints. Reduce analytical uncertainties through focused investments yielding specific capability information.			
FY 2021 Plans: Based on the Air Force Futures-developed Air Force future force design, continue to assess enduring and future Air Force capability challenges and emerging opportunities that could lead to new warfighting concepts as identified by Air Force cross functional teams. Develop advanced concept studies and analyses, and derive operational and technology needs required to realize future solutions to warfighter capability needs.			
FY 2022 Plans: Continue to assess capabilities derived from future Air Force constructs, collaborating within and across Service analysis organizations as subject-matter expertise requires. Develop analytically informed warfighter capability regimes and derive tailored			

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force		Date: May 2021		
Appropriation/Budget Activity 3600 / 6	R-1 Program Element (Number/Name) PE 0606017F / <i>Requirements Analysis and Maturation</i>	Project (Number/Name) 666157 / <i>Development Planning</i>		
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2020	FY 2021	FY 2022
<p>technology contributions. Aggregate capability elements into coarsely defined capability concepts and concepts of employment consistent with projections of Air Force missions and force mixes.</p> <p>FY 2021 to FY 2022 Increase/Decrease Statement: FY 2022 funding increased compared to FY 2021 by \$0.971 million. Funding increased due to emphasis on Air Force future-fight missions and accompanying long-term base defense capability requirements.</p>				
<p>Title: Concept Development</p> <p>Description: Develop operationally consistent and technologically informed capability concepts delivering military utility and informing strategic investment decisions. Validate materiel and non-materiel capability elements through rigorous problem decomposition, engagement with warfighters and with industry, and access to operationally relevant evidence. Discern critical dependencies among capability concept elements, including operational mission assets and technology investments. Distinguish developmental capability concept elements from materiel and non-materiel elements currently available. Develop capability-tailored measures of performance and measures of effectiveness. Identify key drivers for technical risk, cost risk, and schedule risk. Verify suitability of analysis baseline for capabilities being investigated, communicating limitations to stakeholders and proposing mitigation strategies as appropriate. Revisit previously developed capability concepts as needed, update concept elements and operational employment to reflect emerging mission needs and maturing technology alternatives.</p> <p>FY 2021 Plans: Develop advanced concept studies and analyses, and derive operational and technology needs required to realize future solutions to warfighter capability needs.</p> <p>FY 2022 Plans: Continue to develop advanced concepts informing solutions to emerging near-term and anticipated long-term warfighter capability needs. Partner within and across Services as required to inform and hone capability desires. Augment ongoing modeling, development, and/or test activities to acquire key evidence, validate key assumptions, and validate and refine models.</p> <p>FY 2021 to FY 2022 Increase/Decrease Statement: FY 2022 funding increased compared to FY 2021 by \$0.926 million. Funding increased due to emphasis on acquisition-path capability concepts instantiating long-term Air Force base defense capabilities.</p>		4.903	3.854	4.780
<p>Title: Capability Development Strategies</p> <p>Description: Conduct strategic planning activities that translate capability concepts into candidate courses of action suitable for informing future acquisition and future research and development. Identify critical decisions, milestones, and operational employment factors influencing capability courses of action. Identify technology alternatives, potential materiel/non-materiel mixes, and order-of-magnitude cost estimates within candidate courses of action. Develop recommendations for materiel and</p>		6.225	4.022	2.880

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force	Date: May 2021
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Appropriation/Budget Activity 3600 / 6	R-1 Program Element (Number/Name) PE 0606017F / <i>Requirements Analysis and Maturation</i>	Project (Number/Name) 666157 / <i>Development Planning</i>
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B. Accomplishments/Planned Programs (\$ in Millions)	FY 2020	FY 2021	FY 2022
<p>non-materiel investments providing key capability enablers. Develop capability risk mitigation approaches and conduct focused risk reduction. Refine capability cost and schedule drivers as additional information is obtained. Estimate system-of-system, system, sub-system, component, and/or contributing technology performance needed to achieve warfighter-driven thresholds on capability performance and effectiveness. Develop recommendations for time-phased and performance-gated capability delivery, including incremental system and sub-system capabilities where appropriate.</p> <p>FY 2021 Plans: Continue to perform pre-systems acquisition planning activities, including concept refinement, cost estimates, acquisition courses of action, and acquisition milestone documentation.</p> <p>FY 2022 Plans: Continue to perform pre-systems acquisition planning activities. Continue to develop capability concepts into high-level initial designs supporting dependency analysis, performance estimation, risk identification, and additional concept refinement. Develop prioritized recommendations for science and technology investments in the critical path of key capability enablers.</p> <p>FY 2021 to FY 2022 Increase/Decrease Statement: FY 2022 funding decreased compared to FY 2021 by \$1.142 million. Funding decreased due to deferring base-defense acquisition roadmaps until required up-front analysis and concept development has progressed further.</p>			
Accomplishments/Planned Programs Subtotals	16.251	12.049	12.804

	FY 2020	FY 2021
Congressional Add: Program Increase - Nuclear Modernization Analytics <i>FY 2020 Accomplishments:</i> Conduct Congressionally-directed efforts <i>FY 2021 Plans:</i> Conduct Congressionally-directed efforts	7.713	0.000
Congressional Add: Program Increase - Nuclear Deterrence Research <i>FY 2020 Accomplishments:</i> Conduct Congressionally-directed efforts	9.641	-
Congressional Add: Unfunded Requirement - Development Planning <i>FY 2020 Accomplishments:</i> Conduct Congressionally-directed efforts	1.928	-
Congressional Adds Subtotals	19.282	0.000

C. Other Program Funding Summary (\$ in Millions)
N/A

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 6	R-1 Program Element (Number/Name) PE 0606017F / <i>Requirements Analysis and Maturation</i>	Project (Number/Name) 666157 / <i>Development Planning</i>

C. Other Program Funding Summary (\$ in Millions)

Remarks

D. Acquisition Strategy

N/A

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force										Date: May 2021		
Appropriation/Budget Activity 3600 / 6					R-1 Program Element (Number/Name) PE 0606017F / <i>Requirements Analysis and Maturation</i>				Project (Number/Name) 666158 / <i>INTEGRATED SIMULATION AND ANALYSIS</i>			
COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
666158: <i>INTEGRATED SIMULATION AND ANALYSIS</i>	-	46.201	56.207	72.995	0.000	72.995	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

This program, BA 6, PE 0606017F, project 666158, Common Synthetic Training Environment, is a new start.

A. Mission Description and Budget Item Justification

The Integrated Simulation and Analysis project provides a collaborative cross-organizational, multi-domain, holistic enterprise system-of-systems perspective in synthetic environments for modeling, simulation, analysis, and experimentation of systems, systems-of-systems, and concepts under assessment while enabling exploration of innovative materiel and non-materiel alternatives. This effort accomplishes system performance representations/models, environments, architectures, data, and tools that underpin variable fidelity, stand-alone, interactive, and distributed simulations; and virtual prototyping using an adaptive ecosystem comprised of organizations and capabilities aligned with purpose and linkages to Model Based Systems Engineering processes. Integrated Simulation and Analysis combines real-time and constructive simulations, operators-in-the-loop, experimental and operational software and hardware engineered in synthesized environments to conduct rapid air, space, cyber, and multi-domain warfighting capabilities assessments in support of development planning, experimentation, developmental and operational testing, and training requirements.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver Requirements Analysis and Maturation capability. The use of such programs funds would be in addition to the civilian pay expenses budgeted in program element 0605831F.

In FY 2020 \$0.256 million was expended and in FY 2021 \$0.996 million is estimated to be expended for civilian pay expenses in this program element.

B. Accomplishments/Planned Programs (\$ in Millions)

	FY 2020	FY 2021	FY 2022
Title: Modeling, Simulation, Analysis, and Experimentation Ecosystem	15.977	17.334	17.685
Description: Develop enterprise capable, cross-domain system-of-systems modeling, simulation, and analysis capabilities to support development planning, capabilities assessment, and acquisition decisions.			
FY 2021 Plans: Continue to reconfigure and mature a modeling, simulation and analysis infrastructure to include models/tool sets, data management/exchange mechanisms, analytic cadre, organizational relationships and analytical methods to provide integrated simulation capabilities with variable levels of fidelity and realistic representation of battlespace environments. Provide a core set of composable models and a common suite of cross-domain, reusable frameworks at the engineering, engagement, mission,			

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force		Date: May 2021		
Appropriation/Budget Activity 3600 / 6	R-1 Program Element (Number/Name) PE 0606017F / <i>Requirements Analysis and Maturation</i>	Project (Number/Name) 666158 / <i>INTEGRATED SIMULATION AND ANALYSIS</i>		
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2020	FY 2021	FY 2022
<p>campaign, and Air Force enterprise system-of-system levels that can be used to support robust development planning and experimentation for high-priority capability gaps, needs, exploration and warfighting challenges identified by Air Force leadership.</p> <p>FY 2022 Plans: Continue to evolve a modeling, simulation and analysis infrastructure containing extensive software models and software tools consistent with Air Force and Joint enterprise needs, including digital engineering and model-based systems engineering. Continue to enable Modeling and Simulation powered wargaming, support secure data management and sharing, maintain a skilled cadre of analysts, and develop advanced analytical methods required for tailored fidelity of battlespace environments. Continue to make available and enhance composable models and common frameworks that can be used to support robust development planning and experimentation for Air Force leadership.</p> <p>FY 2021 to FY 2022 Increase/Decrease Statement: FY 2022 increased by 0.351 million compared to 2021. Increase is described in plans above.</p>				
<p>Title: Common Synthetic Training Environment</p> <p>Description: Develop a Government-owned synthetic training capability suitable for distributed training scenarios in a single shared environment across multiple warfighting and security domains. This effort is required to address capability gaps highlighted in the Joint Tactical Air Analysis of Alternatives study, to include systemic deficiencies for both live and synthetic training and an expanding gap between warfighter needs and training infrastructure capabilities.</p> <p>This program element may include necessary emergent or unanticipated civilian pay expenses required to manage, execute, and deliver Requirements Analysis and Maturation for emergent or unanticipated weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program element 0605831F.</p> <p>FY 2021 Plans: N/A</p> <p>FY 2022 Plans: Initiate activities in FY 2022 include commencement of programmatic efforts for the overall Common Synthetic Training Environment project; funding a Common Synthetic Training Environment consortium with approximately 8 to 10 vendors; funding prototype/pathfinder efforts that lay the foundation for Multi-Level Security networks, solve latency issues, and build an enduring high fidelity environment; awarding contracts for the environment and Multi-Level Security network development.</p> <p>FY 2021 to FY 2022 Increase/Decrease Statement:</p>		0.000	0.000	27.829

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force		Date: May 2021		
Appropriation/Budget Activity 3600 / 6	R-1 Program Element (Number/Name) PE 0606017F / <i>Requirements Analysis and Maturation</i>	Project (Number/Name) 666158 / <i>INTEGRATED SIMULATION AND ANALYSIS</i>		
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2020	FY 2021	FY 2022
FY 2022 funding increased compared to FY 2021 by \$27.829 million due to initiation of the Common Synthetic Training Environment effort.				
<p>Title: Joint Simulation Environment (JSE)</p> <p>Description: Develops a government-owned and operated modeling and simulation capability that enables multi-platform, multi-domain integration and interoperability. This capability is required to support developmental and operational testing, tactics development, and advanced training for 5th-generation platforms and other future capabilities, critical for force development.</p> <p>This program element may include necessary emergent or unanticipated civilian pay expenses required to manage, execute, and deliver Requirements Analysis and Maturation for emergent or unanticipated weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program element 0605831F.</p> <p>FY 2021 Plans: Continue prototyping and integration of critical JSE components into the baseline encompassing Air Force requirements linking 4th-, 5th-, and 6th-generation systems into a robust environment suitable for test, advanced training, and experimentation. Integrate additional modeling capabilities for electronic warfare, weapons, and space into the baseline to enable integrated testing in a simulated environment.</p> <p>FY 2022 Plans: Continue prototyping and integration of critical JSE components into a robust software environment for test, advanced training, and experimentation. Continue to integrate additional modeling capabilities for electronic warfare, weapons, and space into the baseline.</p> <p>FY 2021 to FY 2022 Increase/Decrease Statement: FY 2022 funding decreased compared to FY 2021 by \$6.381 million. Funding decrease due to projected completion of Fighter Development and World Wide Data Base efforts.</p>		23.226	30.384	24.003
<p>Title: Simulation and Analysis Facility Support</p> <p>Description: Develops real-time, high-fidelity, live-virtual-constructive modeling, simulation, and analysis capability to evaluate network-enabled warfighting capabilities, strategies, concepts of operation, tactics, emerging technologies, and human system interfaces to support and enable acquisition, test, and training.</p> <p>This program element may include necessary emergent or unanticipated civilian pay expenses required to manage, execute, and deliver Requirements Analysis and Maturation for emergent or unanticipated weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program element 0605831F.</p>		3.141	3.489	3.478

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force	Date: May 2021
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Appropriation/Budget Activity 3600 / 6	R-1 Program Element (Number/Name) PE 0606017F / <i>Requirements Analysis and Maturation</i>	Project (Number/Name) 666158 / <i>INTEGRATED SIMULATION AND ANALYSIS</i>
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B. Accomplishments/Planned Programs (\$ in Millions)	FY 2020	FY 2021	FY 2022
<p><i>FY 2021 Plans:</i> Continue to develop upgrades and integrated processes, tools, simulation environments, and capabilities to support live-virtual-constructive modeling, simulation, and analysis with a focus on cross-domain and multi-level security infrastructures as multi-domain operations force multipliers to support analysis, assessment, and experimentation, as well as operational test and training infrastructures.</p> <p><i>FY 2022 Plans:</i> Continue to upgrade and develop integrated processes, tools, simulation environments, and capabilities to support live-virtual-constructive modeling, simulation, and analysis focusing on cross-domain and multi-level security infrastructures supporting analysis, assessment, experimentation, and operational test and training infrastructures.</p> <p><i>FY 2021 to FY 2022 Increase/Decrease Statement:</i> FY 2022 decreased by 0.011 million compared to FY 2021. Decrease described in the plans above.</p>			
Accomplishments/Planned Programs Subtotals	42.344	51.207	72.995

	FY 2020	FY 2021
<i>Congressional Add:</i> Unfunded Requirement - Integrated Simulation and Analysis	3.857	-
<i>FY 2020 Accomplishments:</i> Conduct Congressionally-directed efforts		
<i>Congressional Add:</i> Program Increase - Nuclear Modernization Analytics	-	5.000
<i>FY 2021 Plans:</i> Conduct Congressionally-directed efforts - executed in Project 666157 Development Planning		
Congressional Adds Subtotals	3.857	5.000

C. Other Program Funding Summary (\$ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force</i> / BA 6: <i>RDT&E Management Support</i>	R-1 Program Element (Number/Name) PE 0606398F / <i>Management HQ - T&E</i>
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COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
Total Program Element	-	6.213	5.774	6.163	0.000	6.163	-	-	-	-	-	-
6606TS: <i>Test and Evaluation Support</i>	-	6.213	5.774	6.163	0.000	6.163	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This program element funds civilian salaries of Air Force Test Center (AFTC) management headquarters personnel who lead, guide and direct the operation of AFTC test activities which are included in the Department of Defense (DoD) Major Range and Test Facility Base (MRTFB).

For FY2018 and 2019, funding for AFTC management personnel was included in program 0605898F.

This program is in Budget Activity 6, RDT&E Management Support because this budget activity includes research, development, test and evaluation efforts and funds to sustain and/or modernize the installations or operations required for general research, development, test and evaluation.

B. Program Change Summary (\$ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Previous President's Budget	5.013	5.785	5.766	0.000	5.766
Current President's Budget	6.213	5.774	6.163	0.000	6.163
Total Adjustments	1.200	-0.011	0.397	0.000	0.397
• Congressional General Reductions	0.000	-0.011			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.528	0.000			
• Reprogrammings	0.672	0.000			
• SBIR/STTR Transfer	0.000	0.000			
• Other Adjustments	0.000	0.000	0.397	0.000	0.397

Change Summary Explanation

Increase in FY20 due to CARES Relief funding of \$0.5 million and civ pay below threshold reprogramming of \$0.7 million. The FY 20 PB provided 38 authorizations. The FY20 PB budgeted Average Work Year Cost (AWYC) was \$128.548; significantly short of actual AWYC of \$157. The \$1.2 million fixed the FY20 AWYC and ensured sufficient funding to cover all 39 authorizations.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force	Date: May 2021
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Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 6: RDT&E Management Support</i>	R-1 Program Element (Number/Name) PE 0606398F / <i>Management HQ - T&E</i>
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C. Accomplishments/Planned Programs (\$ in Millions)	FY 2020	FY 2021	FY 2022
Title: Air Force Flight Test Center Civilian Pay Description: Air Force Flight Test Center management headquarters civilian pay FY 2021 Plans: Air Force Flight Test Center management headquarters civilian pay FY 2022 Plans: Air Force Flight Test Center management headquarters civilian pay FY 2021 to FY 2022 Increase/Decrease Statement: Increase in FY22 from FY21 associated with the conversion of one military to a civilian position.	6.213	5.774	6.163
Accomplishments/Planned Programs Subtotals	6.213	5.774	6.163

D. Other Program Funding Summary (\$ in Millions)

N/A

Remarks

E. Acquisition Strategy

N/A

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 6: RDT&E Management Support</i>	R-1 Program Element (Number/Name) PE 0303166F / <i>Support to Information Operations (IO) Capabilities</i>
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COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
Total Program Element	-	0.000	0.000	0.537	0.000	0.537	-	-	-	-	-	-
666158: <i>INTEGRATED SIMULATION AND ANALYSIS</i>	-	0.000	0.000	0.537	0.000	0.537	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-	-	-

Note
 In FY 2022, PE 0303166J, Support to Information Operations (IO) Capabilities, Project Joint Information Operations Range efforts were transferred to PE 0303166F, Joint Information Operations Range, in order to fulfill transfer to Air Force as Lead Command.

A. Mission Description and Budget Item Justification
 The Joint Information Operations Range (JIOR) provides DoD with a closed-loop network that forms a global live-fire information operations range complex. JIOR uses encrypted tunneling over existing transport networks to conduct mission rehearsal, training, testing, concept development and experimentation in support of Information Operations (IO), Electronic Warfare (EW), Offensive Cyber Operations (OCO), Defensive Cyber Operations (DCO), Spectrum Warfare, Space Operations, and Special Operations Forces mission areas in a realistic threat representative environment. JIOR provides the capability to train and certify Cyber Mission Forces on the full spectrum of cyber weapons/capabilities without risk of observation or fratricide. JIOR is accredited by DIA for operations at Unclassified through Top Secret-Special Compartment Information (TS-SCI) in a Multiple Independent Levels of Security (MILS) environment. JIOR is approved for use by Special Access Programs (SAP), Special Access Required Programs (SAR), and for Special Technical Operations (STO). JIOR provides Combatant Commands, Services and Agencies (C/S/A's) and key allied partners the ability to test deployment and gain insights into advanced cyberspace and Electronic Warfare (EW) capabilities under current and future operational environments. JIOR integrates available cyberspace ranges with the training/test communities providing access to low density/high demand test and training resources including critical infrastructure, cyber targets, internet traffic, and opposing forces. JIOR supports Presidential policy and CJCS mandates for training, certification, and recertification of 6000+ cyber mission forces and DoD/Interagency cyber vulnerability assessments. C/S/A's conduct hundreds of mission rehearsal, training, testing, and experimentation events on the JIOR annually. In FY 2022, PE 0303166J, Support to Information Operations (IO) Capabilities, Project Joint Information Operations Range efforts were transferred to PE 0303166F, Joint Information Operations Range, in order to transfer ownership to the Air Force as directed by Joint Chiefs of Staff.

This program is in Budget Activity 6, RDT&E Management Support because this budget activity includes research, development, test and evaluation efforts and funds to sustain and/or modernize the installations or operations required for general research, development, test and evaluation.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600: Research, Development, Test & Evaluation, Air Force I BA 6: RDT&E Management Support	R-1 Program Element (Number/Name) PE 0303166F I Support to Information Operations (IO) Capabilities
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B. Program Change Summary (\$ in Millions)	<u>FY 2020</u>	<u>FY 2021</u>	<u>FY 2022 Base</u>	<u>FY 2022 OCO</u>	<u>FY 2022 Total</u>
Previous President's Budget	0.000	0.000	0.000	0.000	0.000
Current President's Budget	0.000	0.000	0.537	0.000	0.537
Total Adjustments	0.000	0.000	0.537	0.000	0.537
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	0.000	0.000			
• Other Adjustments	0.000	0.000	0.537	0.000	0.537

C. Accomplishments/Planned Programs (\$ in Millions)	<u>FY 2020</u>	<u>FY 2021</u>	<u>FY 2022</u>
Title: Joint Information Operations Range	-	0.000	0.537
Description: The Joint Information Operations Range (JIOR) is a closed-loop network that forms a live-fire, distributed range complex utilizing encrypted tunneling to conduct mission rehearsal, training, testing, and experimentation in a threat representative environment to support Information Operations (IO), Cyberspace, Electronic Warfare (EW), Spectrum Warfare, Space Operations, and Special Operations Forces (SOF) mission areas.			
FY 2021 Plans: N/A Covered under OSD submission			
FY 2022 Plans: Continue testing and evaluating new, cutting edge technologies and refining networking configurations for optimization of the JIOR Continue refining network automation strategy			
FY 2021 to FY 2022 Increase/Decrease Statement: Increase due to movement of program from OSD to Air Force			
Accomplishments/Planned Programs Subtotals			
	-	0.000	0.537

D. Other Program Funding Summary (\$ in Millions)											
<u>Line Item</u>	<u>FY 2020</u>	<u>FY 2021</u>	<u>FY 2022 Base</u>	<u>FY 2022 OCO</u>	<u>FY 2022 Total</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>FY 2026</u>	<u>Cost To Complete</u>	<u>Total Cost</u>
• OPAF 03 834320: C3 Countermeasures	0.000	0.000	1.226	-	1.226	-	-	-	-	-	-

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force	Date: May 2021
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Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 6: RDT&E Management Support</i>	R-1 Program Element (Number/Name) PE 0303166F / <i>Support to Information Operations (IO) Capabilities</i>
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D. Other Program Funding Summary (\$ in Millions)

<u>Line Item</u>	<u>FY 2020</u>	<u>FY 2021</u>	<u>FY 2022</u> <u>Base</u>	<u>FY 2022</u> <u>OCO</u>	<u>FY 2022</u> <u>Total</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>FY 2026</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
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Remarks

E. Acquisition Strategy

N/A

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 6: RDT&E Management Support</i>	R-1 Program Element (Number/Name) PE 0303255F <i>I Command, Control, Communication, and Computers (C4) - STRATCOM</i>
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COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
Total Program Element	-	0.000	21.525	25.340	0.000	25.340	-	-	-	-	-	-
664620: <i>NC3 Enterprise Center</i>	-	0.000	21.525	25.340	0.000	25.340	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-	-	-

Note
 In FY22, \$1M for the Defense Critical Infrastructure Program (DCIP) was realigned from PE 1201921F (Service Support to STRATCOM-Space Activities), to PE 0303255F-C4, Project 664620, program code BEH000 - Critical Infrastructure Protection, to align funding under the correct Major Force Program 03 Intelligence & Communications. In October 2014 memorandum of agreement between USSTRATCOM and Deputy Assistant Secretary of Defense for Defense Continuity and Mission Assurance transferred budget authority for DCIP funding to USSTRATCOM beginning in FY16; not a new start.

A. Mission Description and Budget Item Justification

The NEC, tasked by the Secretary of Defense oversees and monitors operations and security of the enterprise and develops tools to assist in monitoring the readiness of the NC3 architecture and capture the operational risks as adversaries develop the ability to disrupt our capabilities from multiple threat vectors. This effort will fund systems engineering and assessment activities previously accomplished by DISA in support of the NC3 Enterprise. The NEC will capture and integrate process and system data to assess operational risk, characterize multi-domain threats, and explore operational trade space associated with next generation NC3 architectures. The NEC will work with the services to explore new technologies and develop innovative solutions in a virtual environment, and capture metrics that identify system problems and readiness issues before they impact operations. The NEC will also develop digital engineering capabilities to help support governance responsibilities of NC3. The USSTRATCOM DCIP program is a risk management program that seeks to ensure the availability of networked assets critical to USSTRATCOM and other DoD missions. Critical infrastructure assets can include installations, facilities, antennas, vehicles, computing systems, and communications links. DCIP is directed by the Office of the Assistant Secretary of Defense (Homeland Defense & Americas' Security Affairs) [OASD (HD&ASA)]. DCIP manages the identification, prioritization, assessment, and assurance of critical infrastructure as a comprehensive program that includes the development of adaptive plans and procedures to mitigate risk, restore capability in the event of loss or degradation, support incident management, and protect defense critical infrastructure. These programs are in Budget Activity 6, RDT&E Management Support because this budget activity includes research, development, test and evaluation efforts and funds to sustain and/or modernize the installations or operations required for general research, development, test and evaluation.

This program is in Budget Activity 6, RDT&E Management Support because this budget activity includes research, development, test and evaluation efforts and funds to sustain and/or modernize the installations or operations required for general research, development, test and evaluation.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600: Research, Development, Test & Evaluation, Air Force I BA 6: RDT&E Management Support	R-1 Program Element (Number/Name) PE 0303255F I Command, Control, Communication, and Computers (C4) - STRATCOM
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B. Program Change Summary (\$ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Previous President's Budget	0.000	24.564	24.717	0.000	24.717
Current President's Budget	0.000	21.525	25.340	0.000	25.340
Total Adjustments	0.000	-3.039	0.623	0.000	0.623
• Congressional General Reductions	0.000	-0.039			
• Congressional Directed Reductions	0.000	-3.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	0.000	0.000			
• Other Adjustments	0.000	0.000	0.623	0.000	0.623

Change Summary Explanation

FY2021 Congressional Reduction 3.0M

C. Accomplishments/Planned Programs (\$ in Millions)	FY 2020	FY 2021	FY 2022
<p>Title: NC3 Systems Engineering and Assessments</p> <p>Description: Maintain NC3 Systems Engineering and Assessment Capability</p> <p>FY 2021 Plans:</p> <ul style="list-style-type: none"> - Continue oversight and configuration control of the NLCC functional baseline - Continue to identify NLCC capability gaps - Develop engineering courses of action to close those gaps - Continue to recommend plans for future NLCC capabilities - Perform end-to-end testing of fielded capabilities - Perform operational assessments of current capabilities to provide quantitative measures of ongoing system performance and operational efficiency - Continue to develop the NLCC Reference Architecture, its associated NLCC Roadmap, and the technical architecture patterns that will guide future solution architecture development - Demonstrate ability to capture the communication flows in the NC3 system and allow data engineers the ability to identify and work through ideas to improve the reliability and availability of NC3 <p>FY 2022 Plans:</p> <ul style="list-style-type: none"> - Continue oversight and configuration control of the NLCC functional baseline - Continue to identify NLCC capability gaps 	0.000	12.133	12.137

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force		Date: May 2021		
Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 6: RDT&E Management Support</i>		R-1 Program Element (Number/Name) PE 0303255F <i>I Command, Control, Communication, and Computers (C4) - STRATCOM</i>		
C. Accomplishments/Planned Programs (\$ in Millions)		FY 2020	FY 2021	FY 2022
<ul style="list-style-type: none"> - Develop engineering courses of action to close those gaps - Continue to recommend plans for future NLCC capabilities - Perform end-to-end testing of fielded capabilities - Perform operational assessments of current capabilities to provide quantitative measures of ongoing system performance and operational efficiency - Continue to develop the NLCC Reference Architecture, its associated NLCC Roadmap, and the technical architecture patterns that will guide future solution architecture development - Demonstrate ability to capture the communication flows in the NC3 system and allow data engineers the ability to identify and work through ideas to improve the reliability and availability of NC3 <p>FY 2021 to FY 2022 Increase/Decrease Statement: FY21 to FY22 increase due to inflation adjustments.</p>				
<p>Title: Modeling and Simulation and Enterprise Data Environment Development</p> <p>Description: Develop or modify modeling and simulation capability and field the NC3 Enterprise Data Environment</p> <p>FY 2021 Plans:</p> <ul style="list-style-type: none"> - Purchase hardware and software to establish the Enterprise Data Environment - Work with the services to modify or develop models or simulations that allow the ability to evaluate NC3 elements' performance, especially with respect to threats - Work with the services to configure and connect models and simulations to allow a seamless environment within which the data analysts will work to clean the data, manage it, and provide visualizations - Demonstrate the initial mission thread, force direction messages between the airborne command nodes and the submarines - Expand Global Data Integration exposure to Missile Warning and Missile Defense Programs of Record providing an improved operational picture to address SECDEF taskings - Work with the services to add models/simulations that demonstrate a sensor-to-shooter analytical capability <p>FY 2022 Plans:</p> <ul style="list-style-type: none"> - Continue to purchase hardware and software to establish the Enterprise Data Environment - Continue to work with the services to modify or develop models or simulations that allow the ability to evaluate NC3 elements' performance, especially with respect to threats - Continue to work with the services to configure and connect models and simulations to allow a seamless environment within which the data analysts will work to clean the data, manage it, and provide visualizations - Further demonstrate and refine the initial mission thread, force direction messages between the airborne command nodes and the submarines 		0.000	9.392	12.199

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force		Date: May 2021		
Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 6: RDT&E Management Support</i>		R-1 Program Element (Number/Name) PE 0303255F <i>I Command, Control, Communication, and Computers (C4) - STRATCOM</i>		
C. Accomplishments/Planned Programs (\$ in Millions)		FY 2020	FY 2021	FY 2022
<p>- Further expand Global Data Integration exposure to Missile Warning and Missile Defense Programs of Record providing an improved operational picture to address SECDEF taskings</p> <p>- Add models/simulations that demonstrate a sensor-to-shooter analytical capability</p> <p>FY 2021 to FY 2022 Increase/Decrease Statement: FY21 to FY22 increase due to realignment of funding from PE 1201921F (Service Support to STRATCOM-Space Activities), to align funding under the correct Major Force Program 03 Intelligence & Communications; not a new start.</p>				
<p>Title: Mission Assurance Defense Critical Infrastructure Program (DCIP)</p> <p>Description: Supports 1) systems engineering analysis for the decomposition of mission systems and assets, and supporting networks and infrastructure that execute USSTRATCOM missions, 2) research, studies, analysis, and operational assessment of mission system capabilities, methodologies, and tactics to identify critical assets and dependency relationships, and 3) evaluation of mission risk through research, studies, analysis and assessment of threats and hazards paired with exploitable vulnerabilities.</p> <p>FY 2021 Plans: Provide analysis, studies and research of critical infrastructure assets and dependencies supporting all USSTRATCOM assigned missions, to include focusing efforts of future critical infrastructure vulnerability assessments and researching the various sources to perform threats and hazard assessments. Develop link-node display of systems connecting tasked missions and operational plans to mission essential tasks and critical infrastructure assets. Identifies vulnerabilities, and participate in risk management process for remediation and mitigation.</p> <p>The Defense Critical Infrastructure Program is an on-going program, cost to complete is N/A.</p> <p>FY 2022 Plans: Continue to provide analysis, studies and research of critical infrastructure assets and dependencies supporting all USSTRATCOM assigned missions, to include focusing efforts of future critical infrastructure vulnerability assessments and researching the various sources to perform threats and hazard assessments. Develop link-node display of systems connecting tasked missions and operational plans to mission essential tasks and critical infrastructure assets. Identifies vulnerabilities, and participate in risk management process for remediation and mitigation.</p> <p>The Defense Critical Infrastructure Program is an on-going program, cost to complete is N/A.</p> <p>FY 2021 to FY 2022 Increase/Decrease Statement: FY22 increase is due to the realignment of 1M in DCIP funding; not a new start.</p>		-	0.000	1.004
Accomplishments/Planned Programs Subtotals		0.000	21.525	25.340

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force	Date: May 2021
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Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 6: RDT&E Management Support</i>	R-1 Program Element (Number/Name) PE 0303255F <i>I Command, Control, Communication, and Computers (C4) - STRATCOM</i>
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D. Other Program Funding Summary (\$ in Millions)

N/A

Remarks

E. Acquisition Strategy

The Digital Engineering effort is led by the NC3 Enterprise Center (NEC) under USSTRATCOM and will utilize existing contracts to purchase equipment and software, in particular, requesting and funding additional capability development from on-going Service software efforts to model NC3 activities.

Projects funded through DCIP will be awarded using competitive contracts to the maximum extent possible.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 6: RDT&E Management Support</i>	R-1 Program Element (Number/Name) PE 0308602F / <i>ENTEPRISE INFORMATION SERVICES (EIS)</i>
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COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
Total Program Element	-	10.239	9.865	28.720	0.000	28.720	-	-	-	-	-	-
66ACS1: <i>ACQ and Command Support Integration</i>	-	10.239	9.865	28.720	0.000	28.720	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-	-	-

Note
 In FY 2022, PE 0208099F, (Unified Platform), Platform One efforts were transferred to PE 0308602F, (Enterprise Information Services), Platform One in order to enable program visibility for all parties.

A. Mission Description and Budget Item Justification

Enterprise Information Services (EIS) is a portfolio of integrated programs/technologies/services that enables and sustains Air Force Information Management. Knowledge Operations and Development, Security and Operations (DevSecOps) initiatives. EIS provides Air Force personnel access to, and management of, timely, accurate, and trusted mission data, information, and knowledge supporting information/decision superiority. EIS utilizes the services provided by Platform One and Enterprise Resource Planning Common Services (ERP CS).

Platform One and ERP CS provide common platforms, common application support services, data center migration strategy, and security services for hosting AF mission applications. Platform One provides access to existing, accredited and supported DevSecOps infrastructure, to accelerate widespread adoption of DevSecOps methodology IAW DoD Digital Modernization strategy. ERP CS provides the AF target environments for AF ERP mission applications. This acquisition is critical for multiple hosting environments leveraging DoD Joint Information Environment (JIE) Core Data Centers (CDC), commercial cloud capabilities and DISA brokered cloud capabilities in compliance with the Air Force Information Technology (AF IT) baselines. This effort also provides technical expertise, programmatic guidance, and policy navigation that supports AF approved application rationalization processes to multiple hosting environments and enterprise IT Lifecycle Capabilities Integration Environment (CIE) testing of services.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver weapon system capability. The use of such programs funds would be in addition to the civilian pay expenses budgeted in program element 0605831F. In FY20 0.000M was expended for civilian pay expenses in this program element, and in FY21 0.000M is forecasted for civilian pay expenses in this program element.

This requirement supports performance of a full financial audit as required by title 10 U.S.C. Chapter 9A, Sec 240-D.

This program is in Budget Activity 6, RDT&E Management Support because this budget activity includes research, development, test and evaluation efforts and funds to sustain and/or modernize the installations or operations required for general research, development, test and evaluation.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force				Date: May 2021		
Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force</i> / BA 6: <i>RDT&E Management Support</i>		R-1 Program Element (Number/Name) PE 0308602F / <i>ENTEPRISE INFORMATION SERVICES (EIS)</i>				
B. Program Change Summary (\$ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	
Previous President's Budget	10.628	9.883	8.851	0.000	8.851	
Current President's Budget	10.239	9.865	28.720	0.000	28.720	
Total Adjustments	-0.389	-0.018	19.869	0.000	19.869	
• Congressional General Reductions	0.000	-0.018				
• Congressional Directed Reductions	0.000	0.000				
• Congressional Rescissions	0.000	0.000				
• Congressional Adds	0.000	0.000				
• Congressional Directed Transfers	0.000	0.000				
• Reprogrammings	0.000	0.000				
• SBIR/STTR Transfer	-0.389	0.000				
• Other Adjustments	0.000	0.000	19.869	0.000	19.869	
C. Accomplishments/Planned Programs (\$ in Millions)				FY 2020	FY 2021	FY 2022
Title: Enterprise Resource Planning Consolidation				10.239	9.865	8.720
Description: Design, develop and deliver consolidated common services for ERP applications. Target environments are development, test, production and disaster recovery across at least two geographically separated locations. This effort includes completing cybersecurity requirements and acquisition of supporting hardware, software and management resources.						
FY 2021 Plans:						
- Continue to build out architecture design for moving AF ERPs to a cloud environment.						
- Develop baseline and plan for refactoring ERPs to move to an IaaS and SaaS cloud environment.						
- Develop a plan alongside ERPs to promote standardization and chart a path to use out-of-the-box software solutions.						
- Provide common tools and services for the ERPs						
- Perform cloud studies and cloud development for the three ERP programs, DEAMS, AFIPPS and MROi						
FY 2022 Plans:						
- Will continue to build out architecture design for moving AF ERPs to a cloud environment.						
- Will continue baseline and plan for refactoring ERPs to move to a IaaS and SaaS cloud environment.						
- Will continue plan with ERPs to promote standardization and chart a path to use out-of-the-box software solutions.						
- Will continue providing common tools and services for the ERPs						
- Will continue cloud studies and cloud development for the three ERP programs, DEAMS, AFIPPS and MROi						
FY 2021 to FY 2022 Increase/Decrease Statement:						
Funding decrease aligns fiscal requirements to program schedule						
Title: Platform One				-	0.000	20.000

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force	Date: May 2021
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Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force</i> / BA 6: RDT&E Management Support	R-1 Program Element (Number/Name) PE 0308602F / ENTEPRISE INFORMATION SERVICES (EIS)
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C. Accomplishments/Planned Programs (\$ in Millions)	FY 2020	FY 2021	FY 2022
<p>Description: Platform One is the DoD CIO's preferred DevSecOps enterprise solution delivering full stack automation tools, services, and standards as-a-service. Platform One allows programs developing and/or delivering software to focus on building flexible and interoperable mission capability rapidly and securely.</p> <p>FY 2021 Plans: FY2021 covered under PE 0208099F</p> <p>FY 2022 Plans:</p> <ul style="list-style-type: none"> - Continue DevSecOps enablement efforts supporting DoD CIO priorities - Continue development and delivery of DevSecOps tools and services supporting enterprise transform of software capabilities to match the speed of technology and threats - Continue integration and evolution of enterprise zero trust architecture to provide secure and resilient DevSecOps from development to edge employment <p>FY 2021 to FY 2022 Increase/Decrease Statement: Increased funding supports scaling of foundational infrastructure as use of DevSecOps is used more broadly throughout the AF.</p>			
Accomplishments/Planned Programs Subtotals	10.239	9.865	28.720

D. Other Program Funding Summary (\$ in Millions)
N/A

Remarks

E. Acquisition Strategy
N/A

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force</i> / BA 6: <i>RDT&E Management Support</i>					R-1 Program Element (Number/Name) PE 0702806F / <i>Acquisition and Management Support</i>							
COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
Total Program Element	-	5.696	13.384	37.211	0.000	37.211	-	-	-	-	-	-
66ACSI: <i>ACQ and Command Support Integration</i>	-	5.696	13.384	37.211	0.000	37.211	-	-	-	-	-	-

Note

In FY 2022, PE 0602788F, Dominant Information Sciences and Methods, Project 625315, C4I Dominance Technology, efforts were transferred to PE 0702806F, Acquisition and Management Support, Project 66ACSI, Acq and Command Support Integration, in order to improve and accelerate the delivery of artificial intelligence warfighting capabilities under the direction of both the Vice Chief of Staff of the Air Force and the Assistant Secretary of the Air Force (Acquisition, Technology & Logistics) and exercised through the Air Force Capability Development Council.

In FY 2022, PE 0602204F, Aerospace Sensors, Project 622003 EO Sensors & Countermeasures Tech and Project 626095 Sensor Fusion Technology efforts were transferred to PE 0702806F, Acquisition and Management Support, Project 66ACSI, Acq and Command Support Integration, in order, to improve and accelerate the delivery of artificial intelligence warfighting capabilities under the direction of both the Vice Chief of Staff of the Air Force and the Assistant Secretary of the Air Force (Acquisition, Technology & Logistics) and exercised through the Air Force Capability Development Council.

A. Mission Description and Budget Item Justification

The program funds efforts to meet the Defense Acquisition Workforce Improvement Act (DAWIA), as well as Congressional, SECDEF, and SECAF mandates to provide program management execution tools, systems integration and architectural analysis, information technology infrastructure development, and technical workforce management. Funding also provides the framework for Air Force business and acquisition transformation in developing capabilities-based architectures, re-engineering and enabling technologies, integrating robust systems engineering into early acquisition processes, acquisition process improvement analysis, and developing and managing a technical workforce with the expertise to uniformly implement OSD and Air Force engineering guidance and policies. These efforts provide stability in Air Force Acquisition by integrating major processes to reverse trends toward unpredictable program cost, schedule, and performance to facilitate quick response to urgent operational needs from across the entire spectrum of potential conflicts. These integrated capabilities will provide OSD and AF acquisition leadership insights needed to effectively manage a complex portfolio of acquisition programs through more timely and reliable access to authoritative acquisition data.

In FY 2022, the Air Force is refocusing a number of science and technology concept explorations in artificial intelligence (AI) across command, control, communications, sensor, and intelligence areas within PE 0602788F, Dominant Information Sciences and Methods, and PE 0602204F, Aerospace Sensors, to improve and accelerate the delivery of artificial intelligence warfighting capabilities under the direction of both the Vice Chief of Staff of the Air Force and the Assistant Secretary of the Air Force (Acquisition, Technology & Logistics) and exercised through the Air Force Capability Development Council. The Air Force will now perform these science and technology concept explorations under this Program Element as the Air Force continues to respond to and reflect 1) the vision outlined for Artificial Intelligence in the 2018 National Defense Strategy, 2) expectations outlined by the February 2019 White House Executive Order on Artificial Intelligence and the United States Department of Defense (DoD) Artificial Intelligence Strategy, 3) initiatives by other Armed Services to create AI-centric organizations, 4) Senior Air Force leadership goals to develop Artificial

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force	Date: May 2021
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Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 6: RDT&E Management Support</i>	R-1 Program Element (Number/Name) PE 0702806F / <i>Acquisition and Management Support</i>
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Intelligence applications for the United States Air Force in the near term, and 5) senior Department of Defense leadership objectives to enrich and strengthen the broader Air Force and Department Artificial Intelligence ecosystem to impact national security.

This program is in Budget Activity 6, RDT&E Management Support because this budget activity includes research, development, test and evaluation efforts and funds to sustain and/or modernize the installations or operations required for general research, development, test and evaluation.

B. Program Change Summary (\$ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Previous President's Budget	5.913	13.384	17.174	0.000	17.174
Current President's Budget	5.696	13.384	37.211	0.000	37.211
Total Adjustments	-0.217	0.000	20.037	0.000	20.037
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	-0.217	0.000			
• Other Adjustments	0.000	0.000	20.037	0.000	20.037

Change Summary Explanation

FY22 funding increased by \$20.037 due to transfer of funding from PE 0602788F, Dominant Information Sciences and Methods, Project 625315, C4I Dominance Technology, and PE 0602204F, Aerospace Sensors, Project 622003 EO Sensors & Countermeasures Tech and Project 626095 Sensor Fusion Technology.

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force										Date: May 2021		
Appropriation/Budget Activity 3600 / 6					R-1 Program Element (Number/Name) PE 0702806F / <i>Acquisition and Management Support</i>				Project (Number/Name) 66ACSI / <i>ACQ and Command Support Integration</i>			
COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
66ACSI: <i>ACQ and Command Support Integration</i>	-	5.696	13.384	37.211	0.000	37.211	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The program funds efforts to meet the Defense Acquisition Workforce Improvement Act (DAWIA), as well as Congressional, SECDEF, and SECAF mandates to provide program management execution tools, systems integration and architectural analysis, information technology infrastructure development, and technical workforce management. Funding also provides the framework for Air Force business and acquisition transformation in developing capabilities-based architectures, re-engineering and enabling technologies, integrating robust systems engineering into early acquisition processes, acquisition process improvement analysis, and developing and managing a technical workforce with the expertise to uniformly implement OSD and Air Force engineering guidance and policies. These efforts provide stability in Air Force Acquisition by integrating major processes to reverse trends toward unpredictable program cost, schedule, and performance to facilitate quick response to urgent operational needs from across the entire spectrum of potential conflicts. These integrated capabilities will provide OSD and AF acquisition leadership insights needed to effectively manage a complex portfolio of acquisition programs through more timely and reliable access to authoritative acquisition data.

B. Accomplishments/Planned Programs (\$ in Millions)

	FY 2020	FY 2021	FY 2022
<p>Title: Acquisition Mandates</p> <p>Description: Supporting Congressional, SECDEF, and SECAF mandates. Program funding provides the framework for Air Force business and acquisition.</p> <p>FY 2021 Plans: Continue program management and resources management oversight.</p> <p>FY 2022 Plans: Continue program management and resources management oversight.</p> <p>FY 2021 to FY 2022 Increase/Decrease Statement: Increased to perform a study on the Acquisition Workforce to investigate options for realigning funded manpower to programs/efforts tightly aligned to the National Defense Strategy.</p>	0.649	2.782	9.759
<p>Title: Technical and Analytical Support</p> <p>Description: Supports Acquisition Domain-level effort to integrate existing acquisition business systems/services, data, and processes supporting key Acquisition capabilities at the enterprise level (via the Acquisition Domain Capabilities Integration (ADCI) activities). This support entails analysis required to architect an integrated environment on multiple hosting platforms to support the portfolio of acquisition business systems by solving problems across/outside of individual system boundaries with</p>	0.100	2.009	1.849

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force		Date: May 2021		
Appropriation/Budget Activity 3600 / 6	R-1 Program Element (Number/Name) PE 0702806F / <i>Acquisition and Management Support</i>	Project (Number/Name) 66ACSI / <i>ACQ and Command Support Integration</i>		
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2020	FY 2021	FY 2022
<p>the goal of reducing redundancy, improving systems operations, and improving management of data resulting in dramatically improved transparency, efficiency, and effective management of the Acquisition process. This support also helps implement standards for data management and service-oriented design methodology to facilitate efficiency and interoperability as well as providing some business intelligence services. The creation and support of domain-level requirements and governance processes as well as the creation of domain-wide data standards are additional support items provided. In addition, includes support for Artificial Intelligence/Machine Learning (AI/ML) pilots, experimentation associated with business analytics, acquisition program performance measures, and predictive analytics in support of decision-making and workforce training for the acquisition enterprise.</p> <p>FY 2021 Plans: Continuation of work supporting the automation of key Life Cycle Management Center (LCMC) and Space & Missile Systems Center (SMC) acquisition processes and onboarding of new capabilities across the Acquisition Domain. Supports refinement of CIO portfolio Artificial Intelligence (AI)/Machine Learning (ML) vision and incorporating functionalities built as part of AI/ML pilots, experimentation associated with business analytics, acquisition program performance measures, and predictive analytics in support of decision-making and workforce training for the acquisition enterprise.</p> <p>FY 2022 Plans: Continuation of work supporting the automation of key Life Cycle Management Center (LCMC) and Space & Missile Systems Center (SMC) acquisition processes and onboarding of new capabilities across the Acquisition Domain. Supports refinement of CIO portfolio Artificial Intelligence (AI)/Machine Learning (ML) vision and incorporating functionalities built as part of AI/ML pilots, experimentation associated with business analytics, acquisition program performance measures, and predictive analytics in support of decision-making and workforce training for the acquisition enterprise.</p> <p>FY 2021 to FY 2022 Increase/Decrease Statement: Decreased to fund other higher priority requirements.</p>				
<p>Title: Associated Tool Development</p> <p>Description: Upgrade the enterprise tools that assist PMs and acquisition professionals with the day-to-day program management tasks throughout an Acquisition program's lifecycle.</p> <p>FY 2021 Plans: Continue expansion of the integrated IT operational environment (Acquisition Application Store) to include additional Acquisition Program Office automation and additional application development. Continue assessment of appropriate tools.</p> <p>FY 2022 Plans:</p>		0.695	0.746	0.788

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force		Date: May 2021		
Appropriation/Budget Activity 3600 / 6	R-1 Program Element (Number/Name) PE 0702806F / <i>Acquisition and Management Support</i>	Project (Number/Name) 66ACSI / <i>ACQ and Command Support Integration</i>		
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2020	FY 2021	FY 2022
Continue expansion of the integrated IT operational environment (Acquisition Application Store) to include additional Acquisition Program Office automation and additional application development. Continue assessment of appropriate tools. FY 2021 to FY 2022 Increase/Decrease Statement: Increase in requirements				
Title: Project Management Resource Tools (PMRT) Description: Upgrade enterprise PMRT tools that provide program/project resource management support to the Acquisition community. FY 2021 Plans: Continued enhancement of PMRT to allow increased visibility to acquisition programmatic and financial information for all AF Acquisition investment programs. Continued expansion of critical PMRT interfaces via Acquisition Data Service Broker (ADSB) and enhance PMRT native apps. Increase PMRT refactoring and migration to the Cloud for the incorporation of Artificial Intelligence (AI), Machine Learning (ML), and Predictive Analysis. FY 2022 Plans: Continued enhancement of PMRT to allow increased visibility to acquisition programmatic and financial information for all AF Acquisition investment programs. Continued expansion of critical PMRT interfaces via Acquisition Data Service Broker (ADSB) and enhance PMRT native apps. Increase PMRT refactoring and migration to the Cloud for the incorporation of Artificial Intelligence (AI), Machine Learning (ML), and Predictive Analysis. FY 2021 to FY 2022 Increase/Decrease Statement: increase in requirements		2.056	5.646	8.677
Title: Capabilities Integration Environment (CIE) Description: CIE is an Infrastructure as a Service (IaaS) provider that enables application proofs-of-concept, development, integration, and test activities in accredited on-premises government cloud and third-party commercial cloud environments. FY 2021 Plans: Continue support for secure, scalable environment for R&D, DT/OT, integration, exercises, experimentation, acquisition development and direct Warfighter support. FY 2022 Plans:		1.996	2.001	0.938

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force		Date: May 2021		
Appropriation/Budget Activity 3600 / 6	R-1 Program Element (Number/Name) PE 0702806F / <i>Acquisition and Management Support</i>	Project (Number/Name) 66ACSI / <i>ACQ and Command Support Integration</i>		
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2020	FY 2021	FY 2022
Continue support for secure, scalable environment for R&D, DT/OT, integration, exercises, experimentation, acquisition development and direct Warfighter support. FY 2021 to FY 2022 Increase/Decrease Statement: Funding decreased due to move to the cloud environment				
Title: USAF Artificial Intelligence Accelerator at MIT Description: Establish the first phase of a state-of-the-art, end-to-end, sustainable ecosystem of AI technology from basic research to transformed data sets ready for use in developing artificial intelligence algorithms and operational prototypes. This effort creates an environment where integrated teams of MIT researchers and USAF Airmen develop Challenge Problems in AI and invites the academic and commercial communities to propose solutions to those Challenge Problems. FY 2022 Plans: Perform each of the following activities: Guardian Autonomy for Safe Decision Making; Fast AI; Transferring Multi-Robot Learning through Virtual and Augmented Reality for Rapid Disaster Response; Conversational Interaction for Unstructured Information Access and Language Learning; Multimodal Vision for Synthetic Aperture Radar; AI-Assisted Optimization of Training Schedules; The Earth Intelligence Engine; Robust Neural Differential Models for Navigation and Beyond; Objective Performance Prediction & Optimization using Physiological and Cognitive Metrics; AI-Enhanced Spectral Awareness and Interference Rejection; Application of Evolutionary Algorithms for DoD Complex Enterprises and AI Education Research: Know, Apply and Lead. FY 2021 to FY 2022 Increase/Decrease Statement: Increase due to transfer of funding.		-	-	15.000
Title: Development and Retention Description: Supports activities to develop, manage and retain the acquisition workforce. FY 2021 Plans: Continue to perform activities to develop, manage, and retain the acquisition workforce by providing training on enhanced business and engineering processes. FY 2022 Plans: Continue to perform activities to develop, manage, and retain the acquisition workforce by providing training on enhanced business and engineering processes.		0.200	0.200	0.200
Accomplishments/Planned Programs Subtotals		5.696	13.384	37.211

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Air Force		Date: May 2021
Appropriation/Budget Activity 3600 / 6	R-1 Program Element (Number/Name) PE 0702806F / <i>Acquisition and Management Support</i>	Project (Number/Name) 66ACSI / <i>ACQ and Command Support Integration</i>
C. Other Program Funding Summary (\$ in Millions) N/A		
Remarks		
D. Acquisition Strategy N/A		

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 6: RDT&E Management Support</i>	R-1 Program Element (Number/Name) PE 0804731F / <i>General Skill Training</i>
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COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
Total Program Element	-	6.238	1.260	1.506	0.000	1.506	-	-	-	-	-	-
665297: <i>Technical Training Information Systems</i>	-	6.238	1.260	1.506	0.000	1.506	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

TECHNICAL TRAINING MANAGEMENT SYSTEM (TTMS): TTMS provides AETC organizations with a world class commercial-off-the-shelf (COTS) / government-off-the-shelf (GOTS) learning management system which supports six functions: course design and development; student evaluation; instructor management; student management; data analysis; and resource administration. TTMS is a centralized web-based system which provides productivity enhancements and higher degree of efficiency to AETC. The primary requirement objectives currently under development are: 1) Integration of Basic Training Management System (BTMS) capabilities and student records into the TTMS.

This program is in Budget Activity 6, RDT&E Management Support because this budget activity includes research, development, test and evaluation efforts and funds to sustain and/or modernize the installations or operations required for general research, development, test and evaluation.

B. Program Change Summary (\$ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Previous President's Budget	6.475	1.262	1.529	0.000	1.529
Current President's Budget	6.238	1.260	1.506	0.000	1.506
Total Adjustments	-0.237	-0.002	-0.023	0.000	-0.023
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	-0.237	0.000			
• Other Adjustments	0.000	-0.002	-0.023	0.000	-0.023

Congressional Add Details (\$ in Millions, and Includes General Reductions)

Project: 665297: *Technical Training Information Systems*

Congressional Add: *Technical Training Management System (TTMS)*

FY 2020	FY 2021
5.000	-

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force		Date: May 2021		
Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 6: RDT&E Management Support</i>		R-1 Program Element (Number/Name) PE 0804731F / <i>General Skill Training</i>		
Congressional Add Details (\$ in Millions, and Includes General Reductions)		FY 2020	FY 2021	
Congressional Add Subtotals for Project: 665297		5.000	-	
Congressional Add Totals for all Projects		5.000	-	
C. Accomplishments/Planned Programs (\$ in Millions)		FY 2020	FY 2021	FY 2022
Title: Technical Training Management System (TTMS)		1.238	1.260	1.506
Description: Provided TTMS productivity enhancements and higher degree of efficiency to AETC (i.e., Military Training Leader and Basic Training Management System).				
FY 2021 Plans: Continue TTMS development				
FY 2022 Plans: Continue TTMS development				
FY 2021 to FY 2022 Increase/Decrease Statement: Increased development activities				
Accomplishments/Planned Programs Subtotals		1.238	1.260	1.506
		FY 2020	FY 2021	
Congressional Add: Technical Training Management System (TTMS)		5.000	-	
FY 2020 Accomplishments: developed TTMS				
Congressional Adds Subtotals		5.000	-	
D. Other Program Funding Summary (\$ in Millions)				
N/A				
Remarks				
E. Acquisition Strategy				
Not applicable				

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 6: RDT&E Management Support</i>	R-1 Program Element (Number/Name) PE 0804772F / <i>Training Developments</i>
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COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
Total Program Element	-	0.000	0.000	2.957	0.000	2.957	-	-	-	-	-	-
665898: <i>Management HQ-R&D</i>	-	0.000	0.000	2.957	0.000	2.957	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note
This program, BA 6, PE 0804772F, project 665898, New Program, is a new start.

A. Mission Description and Budget Item Justification

Develop effective training approaches. New technologies will be studied and validated. Results will be used increase training effectiveness, and streamline training programs.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver weapon system capability. The use of such programs funds would be in addition to the civilian pay expenses budgeted in program element 0605831F. In FY20 \$0 was expended for civilian pay expenses in this program element, and in FY21 \$0 is forecasted for civilian pay expenses in this program element.

This program is in Budget Activity 6, RDT&E Management Support because this budget activity includes research, development, test and evaluation efforts and funds to sustain and/or modernize the installations or operations required for general research, development, test and evaluation.

B. Program Change Summary (\$ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Previous President's Budget	0.000	0.000	0.000	0.000	0.000
Current President's Budget	0.000	0.000	2.957	0.000	2.957
Total Adjustments	0.000	0.000	2.957	0.000	2.957
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	0.000	0.000			
• Other Adjustments	0.000	0.000	2.957	0.000	2.957

C. Accomplishments/Planned Programs (\$ in Millions)	FY 2020	FY 2021	FY 2022
Title: Training Development	0.000	0.000	2.957

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force	Date: May 2021
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Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 6: RDT&E Management Support</i>	R-1 Program Element (Number/Name) PE 0804772F / <i>Training Developments</i>
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C. Accomplishments/Planned Programs (\$ in Millions)	FY 2020	FY 2021	FY 2022
<p>Description: Develop training technologies, procedures, and processes to increase training effectiveness.</p> <p>FY 2021 Plans: N/A</p> <p>FY 2022 Plans: Develop training technologies and procedures.</p> <p>FY 2021 to FY 2022 Increase/Decrease Statement: New Program</p>			
Accomplishments/Planned Programs Subtotals	0.000	0.000	2.957

D. Other Program Funding Summary (\$ in Millions)

N/A

Remarks

E. Acquisition Strategy

Program Office(s) will select their own acquisition strategies based on Air Education and Training Command's innovation unit (Detachment 24) requirements.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 6: RDT&E Management Support</i>	R-1 Program Element (Number/Name) PE 0909999F / <i>Financing for Cancelled Account Adjustments</i>
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COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
Total Program Element	-	4.703	0.000	0.000	0.000	0.000	-	-	-	-	-	-
664277: <i>Financing for Canceled Account Adj</i>	-	4.703	0.000	0.000	0.000	0.000	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Financing for Cancelled Account Adjustment.

This program is in Budget Activity 6, RDT&E Management Support because this budget activity includes research, development, test and evaluation efforts and funds to sustain and/or modernize the installations or operations required for general research, development, test and evaluation.

B. Program Change Summary (\$ in Millions)

	<u>FY 2020</u>	<u>FY 2021</u>	<u>FY 2022 Base</u>	<u>FY 2022 OCO</u>	<u>FY 2022 Total</u>
Previous President's Budget	0.000	0.000	0.000	0.000	0.000
Current President's Budget	4.703	0.000	0.000	0.000	0.000
Total Adjustments	4.703	0.000	0.000	0.000	0.000
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	0.000	0.000			
• Other Adjustments	4.703	0.000	0.000	0.000	0.000

Change Summary Explanation

Funds were required for payment of cancelled year validated invoices

C. Accomplishments/Planned Programs (\$ in Millions)

	FY 2020	FY 2021	FY 2022
Title: Financing for Cancelled Account Adjustment	4.703	-	-
Description: Funds were required for payment of cancelled year validated invoices.			
Accomplishments/Planned Programs Subtotals	4.703	-	-

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force Date: May 2021

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 6: RDT&E Management Support</i>	R-1 Program Element (Number/Name) PE 0909999F / <i>Financing for Cancelled Account Adjustments</i>
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D. Other Program Funding Summary (\$ in Millions)

N/A

Remarks

E. Acquisition Strategy

N/A

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 6: RDT&E Management Support</i>	R-1 Program Element (Number/Name) PE 1001004F / <i>International Activities</i>
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COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
Total Program Element	-	3.922	3.592	2.420	0.000	2.420	-	-	-	-	-	-
664645: <i>International Cooperative Research & Development</i>	-	3.922	3.592	2.420	0.000	2.420	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The mission of this program is to establish, sustain, expand, and enhance mutually beneficial international partnerships through the implementation of air, space, and cyber international armament cooperation (IAC) agreements thereby supporting USAF and DoD goals and objectives. These International Agreements (IAs) will: significantly improve US and allied conventional defense capacity and capabilities; accelerate the availability of defense systems; realize solutions to meet capability gaps; acquire, upgrade, sustain, and/or support common or interoperable equipment with our allies; create cooperative acquisition, production, or logistic partnerships; promote mutual and equitable sharing of effort, cost, information, and risk; provide access to remote or operational test sites; leverage economies of scale; and promote interoperability and commonality with our allies.

The USAF is party to numerous (+500) air, space, and cyber bilateral and multilateral IAs to solve common US and allied military capability gaps, develop materiel solutions, harmonize requirements, and build interoperability with our international partners. This program element funds the USAF to identify, develop, process, negotiate, conclude, implement, and manage IAs in compliance with statutory provisions, legal authorities, fiscal constraints, technology transfer controls, intellectual property rights, third party transfer provisions, equitability criteria, industrial base factors, political-military interests, and the National Defense Strategy (NDS). Included in this budget are: air, space, and cyber IAC IAs activities; technology assessments; specialized working groups; Air Senior National Representative (ASNR) activities; IAC program and project reviews; bilateral and multilateral staff talks; Engineering and Scientist Exchange Program (ESEP); and Administrative and Professional Exchange Program (APEP).

This program is in Budget Activity 6, RDT&E Management Support because this budget activity includes research, development, test and evaluation efforts and funds to sustain and/or modernize the installations or operations required for general research, development, test and evaluation.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force	Date: May 2021
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Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force</i> / BA 6: <i>RDT&E Management Support</i>	R-1 Program Element (Number/Name) PE 1001004F / <i>International Activities</i>
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B. Program Change Summary (\$ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Previous President's Budget	4.071	3.599	4.221	0.000	4.221
Current President's Budget	3.922	3.592	2.420	0.000	2.420
Total Adjustments	-0.149	-0.007	-1.801	0.000	-1.801
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	-0.149	0.000			
• Other Adjustments	0.000	-0.007	-1.801	0.000	-1.801

Change Summary Explanation

FY22 funding decreased 1.801M to support other higher Air Force priorities.

C. Accomplishments/Planned Programs (\$ in Millions)	FY 2020	FY 2021	FY 2022
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Title: International Partnership Activities	1.672	1.271	0.621
Description: Funds USAF management, support, and oversight of IAC goals and objectives to build global partnerships in support of national security objectives and the National Defense Strategy (NDS). Funds USAF participation in NATO forums to promote harmonization and interoperability. Funds USAF support and participation in OSD bi-lateral IAC forums. Funds SAF/ IA Australian liaison office. Funds technical assessments and discussions that support technology development activities and interoperability. Funds USAF efforts to enhance existing relationships with: Australia, Belgium, Canada, Denmark, France, Germany, Israel, Italy, Japan, NATO, Netherlands, New Zealand, Norway, South Korea, Singapore, Spain, Sweden, and UK. Funds USAF efforts to strengthen/build IAC relationships with: Czech Republic, Estonia, Finland, Hungary, India, Luxembourg, Poland, and Turkey. Funds USAF efforts to establish IAC relationships with: Brazil, Chile, Columbia, Peru, South Africa, Taiwan, and other emerging partners IAW the NDS.			
FY 2021 Plans: Continue ongoing management, support, and oversight of IAC goals and objectives to establish, sustain, expand and enhance mutually beneficial partnerships between the US and coalition partners to meet current and emerging global strategic challenges through optimization of interoperability, integration, and interdependence between coalition forces. Continuing efforts will have an enhanced focus on mutually beneficial partnerships IAW the NDS.			
FY 2022 Plans:			

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force		Date: May 2021		
Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 6: RDT&E Management Support</i>		R-1 Program Element (Number/Name) PE 1001004F / <i>International Activities</i>		
C. Accomplishments/Planned Programs (\$ in Millions)		FY 2020	FY 2021	FY 2022
Continue ongoing management, support, and oversight of IAC goals and objectives to establish, sustain, expand and enhance mutually beneficial partnerships between the US and coalition partners to meet current and emerging global strategic challenges through optimization of interoperability, integration, and interdependence between coalition forces. Continuing efforts will have an enhanced focus on mutually beneficial partnerships IAW the NDS. FY 2021 to FY 2022 Increase/Decrease Statement: Funding increase from FY21 to FY22 will be used to increase efforts in the establishment of mutually beneficial partnerships.				
Title: International Armaments Cooperation (IAC) Agreement Activities Description: Funds the USAF's ability to identify, develop, process, negotiate, conclude, implement, and manage an increasing number of research, development, test, and evaluation (RDT&E) bilateral and multilateral IAC Agreements that meet the goals, objectives, and mission of the USAF and DoD. IAC activities provide the USAF access to: critical geography; remote test ranges; challenged environments; operational environments; threat scenarios; new capabilities; world class R&D facilities; personnel; cost sharing; economies of scale; critical information systems; and launch vehicles. IAC activities will meet warfighter needs and enhance interoperability by cooperating with our partners in the areas of: secure communications, positioning/navigation, situational awareness, materials and composites, human effectiveness, space domain awareness, robotics, nanotechnology, missile warning, position, navigation and timing (PNT), satellite communications, coalition information sharing, biometrics, munitions design, hypersonics, alternative energy, improvised explosive devices (IED) defeat, weapons of mass destruction (WMD) defeat, responsive space, ground and space based radars, sensors, autonomous control, distributed missions, training systems, lasers, weapon systems, weapon delivery, remotely piloted aircraft, armaments interface, intelligence, surveillance and reconnaissance (ISR), sustainment, gap analysis, simulators, combined logistics, software updates, mission planning systems, world-wide flight requirements, electronic warfare, safety, aging aircraft, airlift, tankers, trainers, system modifications, directed energy, weapon stores, acquisition, development, co-production, interoperability, maintenance, system development, and upgrades. FY 2021 Plans: Continue to identify, develop, process, negotiate, conclude, implement, and manage the increasing number of RDT&E bilateral and multilateral IAs that meet the goals, objectives, and mission of the USAF and DoD in the Air Domain. Negotiations will continue on IAs not concluded during FY20. New Air Domain agreements and amendments will be initiated IAW the NDS. FY 2022 Plans: Continue to identify, develop, process, negotiate, conclude, implement, and manage the increasing number of RDT&E bilateral and multilateral IAs that meet the goals, objectives, and mission of the USAF and DoD in the Air Domain. Negotiations will continue on IAs not concluded during FY20. New Air Domain agreements and amendments will be initiated IAW the NDS. FY 2021 to FY 2022 Increase/Decrease Statement:		1.800	1.871	1.349

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 6: RDT&E Management Support</i>	R-1 Program Element (Number/Name) PE 1001004F / <i>International Activities</i>
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C. Accomplishments/Planned Programs (\$ in Millions)	FY 2020	FY 2021	FY 2022
Funding increase from FY21 to FY22 will be used to expand the number of IAC agreement efforts			
Title: Engineer and Scientist Exchange Program/Administrative and Professional Exchange Program (ESEP/APEP) Description: Funds the USAF execution and management oversight of ESEP and APEP programs and personnel. Funds eight to ten field level military and civilian personnel from Air Force Materiel Command Facilities, Product Centers, Test Centers, and Logistic Centers for tours at selected allied partner government laboratories and facilities. FY 2021 Plans: Continue USAF execution and management oversight of the ESEP and APEP personnel overseas. FY 2022 Plans: Continue USAF execution and management oversight of the ESEP and APEP personnel overseas.	0.300	0.300	0.300
Title: Air Force Materiel Command (AFMC) Description: Funds AFMC's ability to support IAC RDT&E activities which directly promotes international collaboration. Funds field level technical assessments and discussions that support technology identification and initial development activities in support of interoperability. FY 2021 Plans: Continue support of AFMC's ability to identify, assess, continue RDT&E activities from 2020 and pursue new areas of cooperation which support interoperability and relationship building efforts with our international partners. FY 2022 Plans: Continue support of AFMC's ability to identify, assess, continue RDT&E activities from 2021 and pursue new areas of cooperation which support interoperability and relationship building efforts with our international partners.	0.150	0.150	0.150
Accomplishments/Planned Programs Subtotals	3.922	3.592	2.420

D. Other Program Funding Summary (\$ in Millions)											
<u>Line Item</u>	<u>FY 2020</u>	<u>FY 2021</u>	<u>FY 2022</u> <u>Base</u>	<u>FY 2022</u> <u>OCO</u>	<u>FY 2022</u> <u>Total</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>FY 2026</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• RDTE 06 1001004F: <i>International Activities</i>	0.000	-	-	-	-	-	-	-	-	-	-

Remarks
 There is no other program funding for the activities pursued under 1001004F International Activities.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force Date: May 2021

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 6: RDT&E Management Support</i>	R-1 Program Element (Number/Name) PE 1001004F / <i>International Activities</i>
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E. Acquisition Strategy

This program element is the only source of USAF funds to identify, develop, process, negotiate, conclude, implement, and manage IAC opportunities to: (a) acquire, develop, upgrade, sustain, and support common or interoperable equipment with our allies; (b) leverage USAF resources through cost sharing and economies of scale with our partners; (c) exploit the best US and allied technologies for equipping coalition forces; and (d) foster interoperability and commonality with our allies. We obtain these benefits only after IAC opportunities are identified, explored, assessed, developed and IAs are negotiated and concluded. This PE provides funds to execute up-front IAC responsibilities, realize cooperative opportunities, assess allied technologies and generate sound, cost-effective cooperative programs between the USAF and our international partners in the areas of Air, Space and Cyberspace. Once IAs are concluded they are transferred to the appropriate technology or system program office and are then funded by the program office.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 6: RDT&E Management Support</i>	R-1 Program Element (Number/Name) PE 1206116F / <i>Space Test and Training Range Development</i>
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COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
Total Program Element	-	14.515	0.000	0.000	0.000	0.000	-	-	-	-	-	-
666156: <i>Space Test and Training Range Development</i>	-	14.515	0.000	0.000	0.000	0.000	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-	-	-

A. Mission Description and Budget Item Justification

In FY 2021, PE 1206116F, Space Test and Training Range Development efforts were transferred to Appropriation 3620, Research, Development, Test & Evaluation, Space Force, PE 1206116SF Space Test and Training Range Development from Appropriation 3600, Budget Activity 06 due to the creation of a new Appropriation for Space Force.

Supports the development of Space Test and Training Range (STTR) capabilities critical for developmental and operational test, training, exercises and tactics development for Space Control systems and Joint National Space Architecture. Includes development, demonstration and delivery of test assets, special test equipment, capabilities and systems required to test, validate, and verify performance of integrated space control systems. Provides a safe, secure, controllable and repeatable environment for the testing of space control mission systems and training operators that in realistic and relevant environments. Additionally, using an agile incremental development approach for range capabilities, this program develops test range assets for both the fixed node Space Range Operation Center (SROC) at Schriever AFB and a deployable Signal Monitoring Unit capability to support complex Joint and AF exercises. The virtual range as part of the Family of Systems (FoS), called Advanced Threat Simulation Environment (ATSE) virtual range, is being developed to accomplish the STTR mission. ATSE integrates to a Distributed Mission Architecture, tying into cyber, air, and space ranges for increased realism and complexity required to prepare space operators for real-world threats. This technology will allow for the first-ever use of a realistic signal environment to increase the realism and efficiency of space control squadron training. Additionally, the STTR Next Space Orbital Engagement (OE) range risk reduction projects will analyze, prototype, and demonstrate potential range systems that is used to support the testing and training of new advanced development space systems, advanced training for space operator orbital engagement maneuvers advanced, and future exercises. These risk reduction activities will include on-orbit capabilities, ground components, communication between nodes, and other required infrastructure.

Space acquisition must respond with speed and agility to emerging adversary threats. Space & Missile Systems Center (SMC) is transforming the organization and implementation of space acquisition to an enterprise approach, maximizing innovation and resiliency, leveraging international, commercial, and mission partnerships, and managing program/project priorities according to an integrated unclassified/classified enterprise space architecture. Expanding the appropriate acquisition authorities and contract mechanisms to deliver capability sooner, SMC will strategically execute experimentation, prototyping, risk reduction, and other efforts to develop new or repurpose capabilities.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver STTR weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program elements 1206392F and 1206398F.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force	Date: May 2021
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Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 6: RDT&E Management Support</i>	R-1 Program Element (Number/Name) PE 1206116F / <i>Space Test and Training Range Development</i>
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This program is in Budget Activity 6, RDT&E Management Support because this budget activity includes research, development, test and evaluation efforts and funds to sustain and/or modernize the installations or operations required for general research, development, test and evaluation.

B. Program Change Summary (\$ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Previous President's Budget	14.942	0.000	0.000	0.000	0.000
Current President's Budget	14.515	0.000	0.000	0.000	0.000
Total Adjustments	-0.427	0.000	0.000	0.000	0.000
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	-0.427	0.000			
• Other Adjustments	0.000	0.000	0.000	0.000	0.000

C. Accomplishments/Planned Programs (\$ in Millions)	FY 2020	FY 2021	FY 2022
Title: Range Control	14.515	0.000	0.000
Description: Development and acquisition of mobile, transportable, virtual, on-orbit, and fixed range monitoring, emulation, and communications capabilities for the space range.			
FY 2021 Plans: N/A			
FY 2022 Plans: N/A			
Accomplishments/Planned Programs Subtotals			
	14.515	0.000	0.000

D. Other Program Funding Summary (\$ in Millions)
N/A

Remarks

E. Acquisition Strategy
All contracts funded in this program element will be awarded using competitive procedures to the maximum extent possible.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force</i> / BA 6: <i>RDT&E Management Support</i>	R-1 Program Element (Number/Name) PE 1206392F / <i>ACQ Workforce - Space & Missile Systems</i>
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COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
Total Program Element	-	187.110	0.000	0.000	0.000	0.000	-	-	-	-	-	-
664280: <i>SMC Civilian Pay</i>	-	187.110	0.000	0.000	0.000	0.000	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-	-	-

A. Mission Description and Budget Item Justification

The Space and Missile Systems Center (SMC) equips US and allied forces with operational space and missile systems, launch systems, and command and control infrastructure in support of global military and national security operations. SMC operates with over 6,300 people and an annual budget exceeding 6.4B providing joint warfighters navigation, communication, weather, warning, force application, and space control capabilities. In FY12, as an AF pilot initiative, SMC acquisition workforce civilian personnel funding was transferred from O&M to RDT&E, AF funds.

SMC is authorized to employ approximately 1,501 civilian acquisition professionals providing the management, tools, and technical capabilities needed to oversee acquisition programs to include material solution analysis, technology development, engineering and manufacturing development, production and deployment, and operations and support. This funding does not include costs for base operating support civilian personnel supporting the Los Angeles AFB 61 Air Base Group. Funding SMC civilian payroll from the RDT&E appropriation provides program managers the flexibility to hire additional civilian personnel with program dollars versus additional contractors in concert with Air Force initiatives in response to the Defense Acquisition Workforce Improvement Act. This program element supports both civilian pay and non-pay support requirements.

In FY 2020 \$187.110M was expended for civilian pay expenses in this program element.

Space acquisition must respond with speed and agility to emerging adversary threats. Space & Missile Systems Center (SMC) has transformed the organization and implementation of space acquisition to an enterprise approach, maximizing innovation and resiliency, leveraging international, commercial, and mission partnerships, and managing program/project priorities according to an integrated unclassified/classified enterprise space architecture. Expanding the appropriate acquisition authorities and contract mechanisms to deliver capability sooner, SMC will strategically execute experimentation, prototyping, risk reduction, and other efforts to develop new or repurpose capabilities.

This program is in Budget Activity 6, RDT&E Management Support because this budget activity includes research, development, test and evaluation efforts and funds to sustain and/or modernize the installations or operations required for general research, development, test and evaluation.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force				Date: May 2021		
Appropriation/Budget Activity 3600: Research, Development, Test & Evaluation, Air Force / BA 6: RDT&E Management Support		R-1 Program Element (Number/Name) PE 1206392F / ACQ Workforce - Space & Missile Systems				
B. Program Change Summary (\$ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	
Previous President's Budget	167.810	0.000	0.000	0.000	0.000	
Current President's Budget	187.110	0.000	0.000	0.000	0.000	
Total Adjustments	19.300	0.000	0.000	0.000	0.000	
• Congressional General Reductions	0.000	0.000				
• Congressional Directed Reductions	0.000	0.000				
• Congressional Rescissions	0.000	0.000				
• Congressional Adds	0.000	0.000				
• Congressional Directed Transfers	0.000	0.000				
• Reprogrammings	19.300	0.000				
• SBIR/STTR Transfer	0.000	0.000				
• Other Adjustments	0.000	0.000	0.000	0.000	0.000	
Change Summary Explanation						
FY 2020: +19.300M; above threshold reprogramming for SMC CivPay requirements						
C. Accomplishments/Planned Programs (\$ in Millions)				FY 2020	FY 2021	FY 2022
Title: SMC Acquisition Workforce				187.110	0.000	0.000
Description: Provide professional government civilian acquisition workforce in support of all Space and Missile Systems Center programs. Rapidly respond to implement system resiliency and situational awareness necessary to operate in the contested space domain. Activities may include, but are not limited to program office support, studies, technical analysis, prototyping, etc.						
FY 2021 Plans: N/A						
FY 2022 Plans: N/A						
Accomplishments/Planned Programs Subtotals				187.110	0.000	0.000
D. Other Program Funding Summary (\$ in Millions)						
N/A						
Remarks						
N/A						

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity
3600: *Research, Development, Test & Evaluation, Air Force I BA 6: RDT&E Management Support*

R-1 Program Element (Number/Name)
PE 1206392F / *ACQ Workforce - Space & Missile Systems*

E. Acquisition Strategy

N/A

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 6: RDT&E Management Support</i>	R-1 Program Element (Number/Name) PE 1206398F / <i>Space & Missile Systems Center - MHA</i>
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COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
Total Program Element	-	10.170	0.000	0.000	0.000	0.000	-	-	-	-	-	-
664280: <i>SMC Civilian Pay</i>	-	10.170	0.000	0.000	0.000	0.000	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-	-	-

A. Mission Description and Budget Item Justification

The Space and Missile Systems Center (SMC) equips US and allied forces with operational space and missile systems, launch systems, and command and control infrastructure in support of global military and national security operations. SMC operates with over 6,300 people and an annual budget exceeding 6.4B providing joint warfighters navigation, communication, weather, warning, force application, and space control capabilities.

Program Element 1206398F, Project: 664281 Space and Missile Systems Center - Major Headquarters Activities (MHA) was established to improve overall performance, strengthen business operations, and achieve efficiencies, effectiveness and cost savings that can be transferred to higher priority needs. PE adds approximately 75 acquisition professionals.

In FY 2020 \$10.170M was expended for civilian pay expenses in this program element.

Space acquisition must respond with speed and agility to emerging adversary threats. SMC has transformed the organization and implementation of space acquisition to an enterprise approach, maximizing innovation and resiliency, leveraging international, commercial, and mission partnerships, and managing program/project priorities according to an integrated unclassified/classified enterprise space architecture. Expanding the appropriate acquisition authorities and contract mechanisms to deliver capability sooner, SMC will strategically execute experimentation, prototyping, risk reduction, and other efforts to develop new or repurpose capabilities.

This program is in Budget Activity 6, RDT&E Management Support because this budget activity includes research, development, test and evaluation efforts and funds to sustain and/or modernize the installations or operations required for general research, development, test and evaluation.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force				Date: May 2021		
Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force</i> / BA 6: <i>RDT&E Management Support</i>		R-1 Program Element (Number/Name) PE 1206398F / <i>Space & Missile Systems Center - MHA</i>				
B. Program Change Summary (\$ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	
Previous President's Budget	10.170	0.000	0.000	0.000	0.000	
Current President's Budget	10.170	0.000	0.000	0.000	0.000	
Total Adjustments	0.000	0.000	0.000	0.000	0.000	
• Congressional General Reductions	0.000	0.000				
• Congressional Directed Reductions	0.000	0.000				
• Congressional Rescissions	0.000	0.000				
• Congressional Adds	0.000	0.000				
• Congressional Directed Transfers	0.000	0.000				
• Reprogrammings	0.000	0.000				
• SBIR/STTR Transfer	0.000	0.000				
• Other Adjustments	0.000	0.000	0.000	0.000	0.000	
C. Accomplishments/Planned Programs (\$ in Millions)				FY 2020	FY 2021	FY 2022
Title: SMC - Major Headquarters Activities				10.170	0.000	0.000
Description: Provide professional government civilian acquisition workforce in support of all Space and Missile Systems Center Management Headquarters Activities. Rapidly respond to implement system resiliency and situational awareness necessary to operate in the contested space domain. Activities may include, but are not limited to SMC Staff support, studies, technical analysis, prototyping, etc.						
FY 2021 Plans: N/A						
FY 2022 Plans: N/A						
Accomplishments/Planned Programs Subtotals				10.170	0.000	0.000
D. Other Program Funding Summary (\$ in Millions) N/A						
Remarks						
E. Acquisition Strategy N/A						

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 6: RDT&E Management Support</i>	R-1 Program Element (Number/Name) PE 1206860F / <i>Rocket Systems Launch Program (SPACE)</i>
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COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
Total Program Element	-	15.613	0.000	0.000	0.000	0.000	-	-	-	-	-	-
661023: <i>Rocket System Launch Program (RSLP)</i>	-	15.613	0.000	0.000	0.000	0.000	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-	-	-

A. Mission Description and Budget Item Justification

Rocket Systems Launch Program (RSLP) provides responsive space and Research, Development, Test and Evaluation (RDT&E) launch vehicle support to DoD and other government agencies using commercial launch systems and excess ballistic missile assets. The RSLP mission was established by the Secretary of Defense in 1972. The small launch program complements the National Security Space Launch (NSSL) program with multiple options to acquire dedicated spacelift and rideshare services for developmental, demonstration, and small operational space vehicles. It provides mission planning, payload integration, vehicle acquisition, processing, launch operations, booster storage and disposition, aging surveillance, maintenance and logistics support for selected DoD responsive space and RDT&E launches. Costs directly attributable to a specific launch or program (e.g., reliability of flight testing, maintenance of launch vehicle processing infrastructure) are paid by the user (Space Force, Navy, Army, Missile Defense Agency (MDA), Defense Advanced Research Project Agency (DARPA), National Reconnaissance Office (NRO), etc.). RSLP maintains exclusive control of deactivated Minuteman and Peacekeeper assets used in testing to include refurbishment, transportation and handling, storage, aging surveillance, and launch services. RSLP also funds general research, development, prototyping, integration, and supplemental reliability of flight testing efforts for launch to enhance the reliability of the Minotaur and other fleet vehicles (e.g., updates to the Modular Mechanical Ordnance Destruct System).

Space acquisition must respond with speed and agility to emerging adversary threats. Space & Missile Systems Center (SMC) has transformed the organization and implementation of space acquisition to an enterprise approach, maximizing innovation and resiliency, leveraging international, commercial, and mission partnerships, and managing program/project priorities according to an integrated unclassified/classified enterprise space architecture. Expanding the appropriate acquisition authorities and contract mechanisms to deliver capability sooner, SMC will strategically execute experimentation, prototyping, risk reduction, and other efforts to develop new or repurpose capabilities.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver Rocket Systems Launch weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program elements 1206392F and 1206398F.

This program is in Budget Activity 6, RDT&E Management Support because this budget activity includes research, development, test and evaluation efforts and funds to sustain and/or modernize the installations or operations required for general research, development, test and evaluation.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force	Date: May 2021
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Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 6: RDT&E Management Support</i>	R-1 Program Element (Number/Name) PE 1206860F / <i>Rocket Systems Launch Program (SPACE)</i>
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B. Program Change Summary (\$ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Previous President's Budget	13.192	0.000	0.000	0.000	0.000
Current President's Budget	15.613	0.000	0.000	0.000	0.000
Total Adjustments	2.421	0.000	0.000	0.000	0.000
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	2.600	0.000			
• SBIR/STTR Transfer	-0.179	0.000			
• Other Adjustments	0.000	0.000	0.000	0.000	0.000

Change Summary Explanation

FY 2020: +2.6M, below threshold reprogramming to augment launch vehicle acquisition, processing, and launch services support.

FY 2022: -0.220M reduction due to inflation.

The FY 2022 funding request was reduced by 0.385 million to account for the availability of prior year execution balances.

C. Accomplishments/Planned Programs (\$ in Millions)	FY 2020	FY 2021	FY 2022
<p>Title: Storage/Refurbishment/Flight Readiness/Demil</p> <p>Description: Storage, refurbishment, inventory control, and demil/disposal of deactivated Minuteman, Peacekeeper and other missile flight test assets</p> <p>FY 2021 Plans: N/A</p> <p>FY 2022 Plans: N/A</p> <p>FY 2021 to FY 2022 Increase/Decrease Statement: N/A</p>	10.844	0.000	0.000
<p>Title: Aging Surveillance</p> <p>Description: Perform aging surveillance-related activities on stored motors</p> <p>FY 2021 Plans:</p>	1.948	0.000	0.000

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force	Date: May 2021
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Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 6: RDT&E Management Support</i>	R-1 Program Element (Number/Name) PE 1206860F / <i>Rocket Systems Launch Program (SPACE)</i>
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C. Accomplishments/Planned Programs (\$ in Millions)	FY 2020	FY 2021	FY 2022
N/A			
FY 2022 Plans: N/A			
FY 2021 to FY 2022 Increase/Decrease Statement: N/A			
Title: Other Launch Support Services Description: Perform launch services activities	2.821	0.000	0.000
FY 2021 Plans: N/A			
FY 2022 Plans: N/A			
FY 2021 to FY 2022 Increase/Decrease Statement: N/A			
Accomplishments/Planned Programs Subtotals	15.613	0.000	0.000

D. Other Program Funding Summary (\$ in Millions)
N/A

Remarks

E. Acquisition Strategy
N/A

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 6: RDT&E Management Support</i>	R-1 Program Element (Number/Name) PE 1206862F / <i>Tactically Responsive Launch</i>
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COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
Total Program Element	-	21.965	0.000	0.000	0.000	0.000	-	-	-	-	-	-
664235: <i>Tactically Responsive Launch</i>	-	21.965	0.000	0.000	0.000	0.000	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-	-	-

A. Mission Description and Budget Item Justification

In FY 2021, PE 1206862F, Tactically Responsive Launch efforts were transferred to Appropriation 3620, Research, Development, Test & Evaluation, Space Force, PE 1206862SF, Tactically Responsive Launch from Appropriation 3600, Budget Activity 06 due to the creation of a new Appropriation for Space Force.

Tactically Responsive Launch will demonstrate space launch operations that will enable the DoD space domain and strategic deterrence objectives. It will fund proof-of-concept tactically responsive space launch demonstrations using emerging and extant commercial launch providers with the goal to place or replace military capability on orbit within 24 hours.

Space acquisition must respond with speed and agility to emerging adversary threats. Space & Missile Systems Center (SMC) is transforming the organization and implementation of space acquisition to an enterprise approach, maximizing innovation and resiliency, leveraging international, commercial, and mission partnerships, and managing program/project priorities according to an integrated unclassified/classified enterprise space architecture. Expanding the appropriate acquisition authorities and contract mechanisms to deliver capability sooner, SMC will strategically execute experimentation, prototyping, risk reduction, and other efforts to develop new or repurpose capabilities.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver Tactically Responsive Launch weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program elements 1206392F and 1206398F.

This program is in Budget Activity 6, RDT&E Management Support because this budget activity includes research, development, test and evaluation efforts and funds to sustain and/or modernize the installations or operations required for general research, development, test and evaluation.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force	Date: May 2021
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Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force</i> / BA 6: <i>RDT&E Management Support</i>	R-1 Program Element (Number/Name) PE 1206862F / <i>Tactically Responsive Launch</i>
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B. Program Change Summary (\$ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Previous President's Budget	19.000	0.000	0.000	0.000	0.000
Current President's Budget	21.965	0.000	0.000	0.000	0.000
Total Adjustments	2.965	0.000	0.000	0.000	0.000
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	3.660	0.000			
• SBIR/STTR Transfer	-0.695	0.000			
• Other Adjustments	0.000	0.000	0.000	0.000	0.000

Change Summary Explanation

FY 2020: +\$3.66M was added to support the initial demonstration launch in FY 2021.

C. Accomplishments/Planned Programs (\$ in Millions)	FY 2020	FY 2021	FY 2022
Title: Tactically Responsive Launch-2	19.000	0.000	-
Description: FY 2020 funds are supporting the initial TacRL-2 demonstration flight in FY 2021.			
FY 2021 Plans: N/A			
FY 2021 to FY 2022 Increase/Decrease Statement: Funding moved to 3620 in FY21			
Title: Tactically Responsive Launch	2.965	0.000	-
Description: FY 2020 BTR funds support the initial TacRL-2 demonstration flight in FY 2021.			
FY 2021 Plans: FY 2020 funds are supporting the initial TacRL-2 demonstration flight in FY 2021.			
FY 2021 to FY 2022 Increase/Decrease Statement: Funding moved to 3620 in FY21			
Accomplishments/Planned Programs Subtotals			
	21.965	0.000	-

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force	Date: May 2021
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Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 6: RDT&E Management Support</i>	R-1 Program Element (Number/Name) PE 1206862F / <i>Tactically Responsive Launch</i>
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D. Other Program Funding Summary (\$ in Millions)

N/A

Remarks

E. Acquisition Strategy

Use new and existing launch service contracts, Small Business Innovative Research contracts, and Other Transaction Authority (OTA) Agreements to take advantage of evolving commercial capabilities.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force **Date:** May 2021

Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force</i> / BA 6: <i>RDT&E Management Support</i>	R-1 Program Element (Number/Name) PE 1206864F / <i>Space Test Program (STP)</i>
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COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
Total Program Element	-	25.235	0.000	0.003	0.000	0.003	-	-	-	-	-	-
662617: <i>Free-Flyer Spacecraft Missions</i>	-	25.235	0.000	0.003	0.000	0.003	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-	-	-

Note

Note: The \$0.003M entry in FY 2022 is a database error. All funding after FY 2020 for the Space Test Program (STP) resides in PE 1206864SF, in the 3620 Research, Development, Test & Evaluation, Space Force appropriation.

A. Mission Description and Budget Item Justification

The Space Test Program (STP) conducts space test missions for the purpose of accelerating DoD space technology transformation while lowering developmental risk. The program integrates, launches, and operates an optimally selected number of DoD-sponsored experiments consistent with Space Experiments Review Board (SERB) priority, opportunity, and funding. STP missions provide a cost-effective way to flight test new militarily relevant space system technologies, concepts, and designs, providing a way to:

- Support the acquisition block development approach
- Demonstrate and develop responsive research and development (R&D) space capabilities
- Provide early operational capabilities to quickly react to new developments
- Perform operational risk reduction through direct flight test of prototype components
- Improve operational design by characterizing the space environment, event, or sensor physics proposed for an operational system/system upgrade
- Develop, integrate, test, and acquire advanced payload support hardware for launch vehicles (LV), commercial launch services, and human-rated spaceflight vehicles
- Expand and leverage international opportunities to further access for the US and its allies' R&D payloads

The Deputy Secretary of Defense Space Test Program Management & Funding Policy, issued in July 2002, reaffirmed STP as the primary provider of spaceflight for the DoD space research community. The July 2002 policy statement also reaffirmed STP's role as the single manager for all DoD payloads on the International Space Station (ISS).

Space acquisition must respond with speed and agility to emerging adversary threats. Space and Missile Systems Center (SMC) is transforming the organization and implementation of space acquisition to an enterprise approach, maximizing innovation and resiliency, leveraging international, commercial, and mission partnerships, and managing program/project priorities according to an integrated unclassified /classified enterprise space architecture. Expanding the appropriate acquisition authorities and contract mechanism to deliver capability sooner, SMC will strategically execute experimentation, prototyping, risk reduction, and other efforts to develop new, or repurpose capabilities.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force	Date: May 2021
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Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 6: RDT&E Management Support</i>	R-1 Program Element (Number/Name) PE 1206864F / <i>Space Test Program (STP)</i>
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This program element may include necessary civilian pay expenses required to manage, execute, and deliver STP weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program elements 1206392F and 1206398F.

This program is in Budget Activity 6, RDT&E Management Support because this budget activity includes research, development, test and evaluation efforts and funds to sustain and/or modernize the installations or operations required for general research, development, test and evaluation.

B. Program Change Summary (\$ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Previous President's Budget	26.097	0.000	0.000	0.000	0.000
Current President's Budget	25.235	0.000	0.003	0.000	0.003
Total Adjustments	-0.862	0.000	0.003	0.000	0.003
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	-0.860	0.000			
• Other Adjustments	-0.002	0.000	0.003	0.000	0.003

Change Summary Explanation

FY 2020: -\$0.002 UOA paid from current year.

FY 2022: \$0.003M entry is a database error. All funding after FY 2020 for the Space Test Program (STP) resides in PE 1206864SF, in the 3620 Research, Development, Test & Evaluation, Space Force appropriation.

C. Accomplishments/Planned Programs (\$ in Millions)	FY 2020	FY 2021	FY 2022
Title: Payload Integration	18.627	0.000	0.003
Description: Integrate payloads onto spaceflight missions, including free-flyer payloads, hosted payloads, sounding rockets, experiments on the International Space Station (ISS), and commercial missions. Includes acquisition of associated spacecraft and integration hardware.			
FY 2021 Plans: N/A			
FY 2022 Plans: N/A			
FY 2021 to FY 2022 Increase/Decrease Statement:			

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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Air Force		Date: May 2021		
Appropriation/Budget Activity 3600: <i>Research, Development, Test & Evaluation, Air Force I BA 6: RDT&E Management Support</i>		R-1 Program Element (Number/Name) PE 1206864F / <i>Space Test Program (STP)</i>		
C. Accomplishments/Planned Programs (\$ in Millions)		FY 2020	FY 2021	FY 2022
Insignificant increase				
Title: Launch Vehicle and Launch Services		4.380	0.000	0.000
Description: Purchase launch services, launch vehicles and launch vehicle support for free-flyer payloads, hosted payloads, sounding rockets, experiments on the ISS, and commercial spaceflight missions, and support the spaceflight worthiness and "Do No Harm" certification for Space and Missile Systems Center (SMC) and US Space Force (USSF) HQ.				
FY 2021 Plans: N/A				
FY 2022 Plans: N/A				
Title: On Orbit Satellite Operations		2.228	0.000	0.000
Description: Execute first-year operations and operations support for STP-sponsored missions.				
FY 2021 Plans: N/A				
FY 2022 Plans: N/A - Database Error				
Accomplishments/Planned Programs Subtotals		25.235	0.000	0.003
D. Other Program Funding Summary (\$ in Millions) N/A				
Remarks In FY2021, PE 1206864F, Space Test Program efforts were transferred to Appropriation 3620, Research, Development, Test & Evaluation, Space Force, PE 1206864SF Space Test Program from Appropriation 3600, Budget Activity 06 due to the creation of a new Appropriation for Space Force.				
E. Acquisition Strategy N/A				

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